

THE
PURSUIT OF KNOWLEDGE

UNDER DIFFICULTIES;

ILLUSTRATED BY ANECDOTES.

IN THREE VOLUMES.

VOL. II.

A NEW EDITION,

REVISED AND CORRECTED BY THE AUTHOR.

LONDON:

CHARLES KNIGHT & Co., LUDGATE STREET.

1845.

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EDITED BY A. C. CROFTES

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CHAPTER XVI.

Devotion to Knowledge in extreme poverty. Erasmus; Kepler; Schaeffer; Bullinger; Musculus; Postellus; Castalio; Adrian VI.; Perrier; Claude Lorraine; Salvator Rosa; Marmontel; Hoche; Lagrange; Dr. Johnson; Dr. Parr; Spagnoletto; Le Jay; Castell; Davies; Tytler; William Davy.—In exile and imprisonment. Ovid; Boethius; Buchanan; Tasso; Smart; Maggi; Le Maistre; Lorenzini; Prynne; Madame Roland; Raleigh; Lady Jane Grey; James I. (of Scotland); Lovelace.

IN attempting to illustrate such a subject as the triumphs of the Love of Knowledge, and to set forth the exceeding might of that passion, the delight with which the indulgence of it is fraught, and the obstacles of all sorts in the way of its gratification which it has so often overcome, the materials which present themselves are so abundant and so various, that the chief difficulty in using them is which to choose. The examples we have already cited may be considered sufficient to show how perfectly practicable it is to unite the pursuit of literature with that of any description of business or professional occupation. We shall now proceed to notice some aspirants after knowledge, who have had other difficulties to struggle with than those arising from either the seducing excitements or engrossing cares and toils of active life.

Anecdotes illustrating the devotion with which knowledge has been pursued under the pressure of severe penury, or other forms of worldly misfortune, are evidences, not of any calamities to which literature has a peculiar tendency to expose its votaries, but rather of the power with which it arms them to conquer and rise supe-

rior to calamities. Students, and authors, and men of genius, have had their share of adversity with others; but few others enjoy their peculiar advantages, if not for warding it off, at least for bearing up against it. The man who is most to be pitied under misfortune, is he whose whole happiness or misery hangs on outward circumstances. The scholar has sources of enjoyment within himself, of which no severity of fortune can altogether deprive him. Hence, a man who is truly in love with philosophy, will often think but lightly of sufferings and privations which would to another be almost intolerable. If his body be in want, his mind has store of riches. When ERASMUS was a poor student at Paris, he was indeed very anxious to be a little richer; but, almost in rags as he was, it was not fine or even comfortable raiment after which he principally longed. "As soon as I get money," says he, in a letter to a friend, "I will buy first Greek books, and then clothes." "It is the mind," says Shakspeare, "that makes the body rich;" and so the young scholar felt. Of his two contemplated purchases, it was not the clothes, he knew, but the Greek books, that were to bring him anything permanent, in the way either of enjoyment or distinction.

And similar to those of Erasmus have been the feelings of many another aspirant after intellectual eminence, when struggling, like him, with the inconveniences of indigence, or braving every variety of labour and privation in pursuit of the object on which his heart was set. The illustrious KEPLER spent his life in poverty; yet, amidst all his difficulties, he used to declare that he would rather be the author of the works he had written than possess the duchy of Saxony. There is hardly any severity of endurance to which ardent spirits have not subjected themselves, under the inspiration of an attachment to literature or the arts. The German naturalist, SCHAEFFER, was so poor when he entered the University of Halle, that for the first six months of his attendance his whole expenditure did not exceed a few halfpence a day: a little bread and a few vegetables boiled in water, were his only food; and, although the winter was a very

rigorous one, no fire ever warmed his chimney. Yet all this he bore cheerfully, counting the opportunity he enjoyed of pursuing his studies as more than a compensation for it all. This heroism, indeed, has never been uncommon among German scholars. We have already mentioned the cases of Heyne and Winckelman. The latter, according to a practice not unusual among poor students in that country, was wont, while attending the grammar-school, to support himself chiefly by singing at night through the streets; and not himself only, but in a great measure his father also. But Winckelman's expenses were always on the very humblest scale. Even when his fondest wishes were at last crowned by an opportunity having been afforded him of visiting Rome, he considered himself in possession of an ample revenue in the pension of a hundred crowns, which he was allowed, by his patron Father Rauch, in addition to his board, which he had free. The learned theologian, HENRY BULLINGER, one of the distinguished names of the Reformation, had in like manner supported himself at school for several years by his talents as a street musician. His contemporary and fellow-labourer in the same cause, WOLFGANG MUSCULUS, had commenced his career as a scholar in a similar manner, having for some time sung ballads through the country, and begged his way from door to door, in order to obtain a pittance wherewith to put himself to school; he was at length charitably received into a convent of Benedictine monks, who, greatly to his delight, offered to educate him, and admit him of their order. Musculus was afterwards, on embracing the tenets of the Lutherans, reduced to such distress, that he was obliged to send his wife to service, and to bind himself apprentice to a weaver of Strasburg, who no sooner discovered his heretical opinions than he turned him out of doors. He had then no other resource but to offer himself as a common labourer to assist in repairing the fortifications of the city. Yet even in this situation he employed every moment he could spare in study; and applied himself, in particular, with so much ardour to the Hebrew language, that he placed himself eventually

almost at the head of the scholars by whom that branch of learning was cultivated in his time.

Another great Orientalist of that age, and in many respects one of the most extraordinary characters of any age, WILLIAM POSTELLUS, was, when merely a boy, so fond of reading, that he would often, it is related, while engaged with his book, forget to take his meals. Having set out from his native village in Normandy on the road to Paris, in the expectation of finding means to pursue his studies in that capital, he was attacked, in the course of his journey, by robbers, who took from him all the little he had in the world, and used him besides so barbarously, that his vexation and the wounds he had received together obliged him to take refuge in an hospital, where he lay for two years before his health was restored. On his recovery, he bent his steps once more towards Paris; being at the time, however, in such a state of destitution, that he had no way of obtaining wherewithal to buy himself a coat, except by offering his services as a reaper to assist in cutting down the crop which then happened to be ready for the sickle. Having arrived at Paris, he thought himself fortunate in being received as a domestic into the College of St. Barbe, not doubting that even this situation would afford him, in some degree, those opportunities of improvement which he so ardently longed for. Accordingly, having contrived to get possession of a Greek and a Hebrew grammar, he soon made himself master of both these languages, solely by his own efforts; and, although the fragments of time he could steal from the labours of his humble place were all the leisure he had for study, he afterwards became one of the greatest scholars of his time, being distinguished especially for his knowledge both of ancient and modern languages, of which there was scarcely one that he was not familiar with. To his vast acquirements, however, he added, in the latter part of his life, no little extravagance both of opinion and conduct; and, indeed, some of his notions could have proceeded from nothing else than partial derangement. But it does not belong to our present purpose to pursue this part of his history. Some of his

works exhibit an extraordinary mixture of learning and genius, with the most melancholy delusion and absurdity.

SEBASTIAN CASTALIO, whose elegant Latin version of the Scriptures we have mentioned in a former chapter, was for many years of his life so poor, that, having a wife and family to support, he was obliged to employ the whole day in labouring in the fields, and could afford only the earlier part of the morning for study. Yet, even in these circumstances, literature was the great consolation of his life. Calvin, with whom he had quarrelled, having, in the heat of controversy, and in the same spirit of cruelty with which he hunted Servetus to death, allowed himself directly to charge him with theft, because he was in the habit of occasionally bringing home with him a little wood to serve for fuel, was answered by Castalio in a mild but dignified remonstrance, in which he admits that, as he dwelt on the banks of the Rhine, he had indeed been sometimes accustomed to employ himself, at leisure hours, in catching with a hook the floating wood which it carries down in its inundations, in order to warm his family,—the wood being in fact, he remarks, public property, and belonging to the first taker. And this he did, he says, being at the time wholly occupied with his translation of the Scriptures, and resolved rather to beg than to quit it.

Pope ADRIAN VI. was the son of a poor barge-builder of Utrecht, who, desirous of procuring for his son a good education, and yet unable to pay for it, found means at last to get him admitted among the boys educated gratuitously at the university of Louvain. While attending this seminary, however, the pecuniary resources of the young scholar were so extremely scanty, that he was unable to afford himself candles whereby to study at night. But he did not on that account spend his time in idleness. He used to take his station, we are told, with his book in his hand, in the church porches, or at the corners of the streets, where lamps were generally kept burning, and to read by their light. After passing through a succession of ecclesiastical preferments, which he owed to his eminent acquirements and unimpeachable character, Adrian was appointed preceptor to the young Archduke

Charles, grandson to Ferdinand, King of Spain, who afterwards became so powerful and celebrated as the Emperor Charles V. To this connection he was indebted for his elevation to the papal throne, which he ascended in the sixty-second year of his age, and occupied for two years, having died in 1523. The short time he held this lofty station was not, however, the happiest period of Adrian's life, as the following inscription which he desired to be placed over his tomb may testify:—"Here lies Adrian VI., who esteemed no misfortune which happened to him in life so great as his being called to govern."

We have already had occasion to quote several examples of the enthusiasm with which cultivators of the fine arts have devoted themselves to the acquisition of that knowledge and skill to which they afterwards owed their eminence and fame. The dream of every young artist's ambition is Rome. The French painter, FRANCIS PERRIER, when a young man, living in poverty and obscurity at Lyons, was haunted by so eager a desire of visiting "the eternal city," that he gladly consented to act as guide to a blind person who was travelling thither, on condition that the latter should pay the expenses of both; and in this way, after a journey of above four hundred miles on foot, he arrived among those monuments of ancient and modern genius, which, ere he had yet seen them, he had so long and fondly worshipped in fancy. The first engagement he obtained was a humble and laborious one—to make copies for a dealer in paintings from originals of merit; but he profited by the advantage it afforded him of studying the works of several distinguished masters. Perrier afterwards appeared in Paris, and obtained a high reputation among the artists of his day. He died in that city in 1660.

CLAUDE LORRAINE is said to have been originally apprenticed to a pastry-cook, and to have been, on his first appearance in Rome, so destitute of resources, that he was obliged to accept of the meanest employment connected with the art he was desirous of studying, and in which he afterwards attained so rare an eminence. SALVATOR ROSA, who was born in 1615, a few years later than

Claude, had made himself already an able painter, principally by the study of nature, while still residing in his native village in the neighbourhood of Naples, and before he had ever been able to gratify his earnest desire of visiting Rome. Salvator's genius, indeed, was nursed in hardships and sorrows, which yet had only the effect of strengthening and exalting it. When very young, he had been left, by the death of his father, the sole support of his mother and sisters; and so heavily did this burthen press upon him, that, although he wrought hard, he was sometimes, it has been said, after finishing a picture, scarcely able to save enough from the scanty price he received for it, to purchase the canvas for another. He was in his twentieth year, when a friend and brother artist, somewhat richer than himself, proposed to take him to Rome with him, and to pay the expenses of both; an offer which Salvator gladly accepted. When he found himself at last in that celebrated capital, his ardour would scarcely suffer him to take sustenance or repose, while he examined, with the enthusiasm of a painter and a poet, the precious remains of ancient art by which he was surrounded; and the incessant fatigue to which he exposed himself at last brought on an attack of fever, which rendered it necessary for him to be carried back to Naples. It was some years before it was again in his power to visit Rome; but it continued to fill his visions of the future, and to make his residence at Naples seem an exile. At length, however, his eye rested once more on the objects among which his heart had so long been. Rome was at this time crowded with painters, whose names have now become the household words of fame, and several of whom were even already regarded with an admiration as great as is ever bestowed on living genius. But, undismayed by their glory, Salvator aspired from the first to be, not the imitator of any of them, but their competitor and rival,—to form a style, and found a school, of his own. We need not say how greatly he succeeded in this object, since his name, too, is now familiar to every ear, as one of the most distinguished in the second generation of the great painters of Italy.

The celebrated MARMONTEL was born of parents who belonged to the humblest rank of the people, and was indebted for the elements of education to the charity of a priest. The late French general HOCHÉ, who distinguished himself in the wars of the Revolution, was originally a stable-boy. While in that situation, and after having enlisted in the army, which he did at the age of sixteen, he used to work at any employment he could find during the day, to get money to buy books, which he would often spend the greater part of the night in reading. LAGRANGE, the French translator of Lucretius, was so poor while attending the university, that his only food for the day was a little bread, which he carried with him from home in the morning, and used to eat in an alley, or the vestibule of a church, during the intervals between the different classes. Dr. JOHNSON



Dr. Johnson.

was indebted for his maintenance at college to the scanty aid of a wealthy individual, who professed to keep him there as a companion to his son. The late learned Dr. PARR, after having, at the early age of fourteen, distinguished himself above all his schoolfellows at Harrow, was taken from school by his father, who wished to initiate him in his own business of a surgeon and apothecary. Young Parr, however, continued still to pursue his studies with as much benefit as before, by getting one or other of his old companions to report to him the master's remarks on the lesson of every day as it was read; until his father, finding the contest with nature likely in this case to turn out a vain one, at last consented that he should proceed to the university. He had been but a short time, however, at Cambridge, when his father died; and this event, leaving him almost literally penniless, compelled him with a heavy heart to bid farewell also to this new theatre of his ambition. Yet these cruel disappointments, and a long succession of other struggles with indigence and misfortune, by which they were followed, did not prevent Parr from attaining eventually the distinction he merited, and becoming one of the greatest scholars of his time. Such early difficulties form often, indeed, the very influences to which no small portion of the future eminence of their victims is to be attributed. The late illustrious mathematician Lagrange used to say, that he certainly never should have been the mathematician he had turned out, if he had been born to a fortune, instead of having had to make his own way to one.

It is related of the painter Joseph Ribera, commonly called Lo SPAGNOLETTA, that, after having for some time pursued his art at Rome in great indigence, he was patronised by one of the cardinals, who, giving him apartments in his palace, enabled him to live at his ease; but that, after a while, finding himself growing indolent amidst his new comforts and luxuries, he actually withdrew himself from their corrupting influence, and voluntarily returned to poverty and labour—thus exhibiting the choice of Hercules in real life, and verifying the beautiful fiction of Xenophon.

Many of the devotees of literature have pursued the objects upon which their hearts were set with a resolution which no difficulties seem to have had any effect in alarming or impairing. The French Polyglot Bible of 1645, in ten volumes folio, was the undertaking of an advocate of Paris, GUY MICHEL LE JAY, who, having spent his fortune on its completion, declined the overtures of Cardinal Richelieu to repay part of the expenditure on condition of the work being allowed to come forth in his name, preferring to submit to poverty rather than to share with any one the glory of so great an enterprise. Our own countryman, the most learned Dr. EDMUND CASTELL, expended his whole fortune, amounting to twelve thousand pounds, on his 'Lexicon Heptaglotton,' which appeared in 1669, as a companion to Bishop Walton's Polyglot Bible; and he, besides, lost his sight in preparing the work, to which he is said to have devoted eighteen hours a day for seventeen years.

MILES DAVIES, a writer on antiquities in the earlier part of last century, some of whose works show considerable learning, is said to have hawked his productions himself from door to door. A work, entitled 'Essays on the most important Subjects of Natural and Revealed Religion,' which appeared at Edinburgh in 1772, was both composed and printed by the late Mr. JAMES TYTLER, while he resided in the sanctuary of Holyrood House, without ever having been written, the sentences being merely formed in the first instance in the mind of the author, and then directly put in types. This reminds us of what Franklin tell us of Keimer, the first master with whom he served at Philadelphia, whom he found, on being introduced to him, employed in printing an Elegy on a young poet of the place, who had recently died. "Keimer," says he, "made verses, too, but very indifferently. He could not be said to *write* them, for his method was to compose them in the types directly out of his head: there being no copy, but one pair of cases, and the elegy probably requiring all the letter, no one could help him."

But perhaps the most extraordinary instance of literary

industry and perseverance on record is afforded us in the history of a work entitled 'A System of Divinity,' by the Reverend WILLIAM DAVY, A.B., a clergyman of the Church of England. Mr. Davy was born in 1743, near Chudleigh in Devonshire, where his father resided on a small farm, his own freehold. From a very early age he gave proofs of a mechanical genius, and when only eight years old, he cut out with a knife and put together the parts of a small mill, after the model of one that was then building in the neighbourhood, the progress made in constructing which he used to observe narrowly every day, while he proceeded with equal regularity in the completion of his own little work. When the large mill was finished, it was found not to work exactly as it ought to have done, and the defect at first eluded the detection even of the builder. It is said that, while they were endeavouring to ascertain what was wrong, the young self-taught architect made his appearance, and, observing that his mill went perfectly well, pointed out, after an examination of a few minutes, both the defect and the remedy.

Being intended for the Church, he was placed at the Exeter Grammar School; and here he distinguished himself by his proficiency in classical learning, while he still retained his early attachment to mechanical pursuits, and exercised his talents in the construction of several curious and ingenious articles. At the age of eighteen he entered at Oxford, where he took the degree of B.A. at the usual time. It was during his residence at the University that he conceived the idea of compiling a system of divinity, to consist of selections from the best writers, and began to collect, in a common-place book, such passages as he thought would suit his purpose.

On leaving college, he was ordained to the curacy of Moreton, in the diocese of Exeter, and not long after he removed to the adjoining curacy of Lustleigh, with a salary of 40*l.* a-year. In the year 1786 he published, by subscription, six volumes of sermons, by way of introduction to his intended work; but this proved an unfortunate speculation, many of the subscribers forgetting to

pay for their copies, and he remained in consequence indebted to his printer above a hundred pounds. This bad success, however, did not discourage him: he pursued his literary researches and completed the work. But when his manuscript was finished he found that, from its extent, it would cost two thousand pounds to get it printed. In these circumstances, he again contemplated publication by subscription, and issued his proposals accordingly; but the names he collected were too few to induce any bookseller to risk the expense of an impression of the work. Determined not to be defrauded of the honours of authorship, Mr. Davy now resolved to become a printer himself. So, having constructed his own press, and purchased from a printer, at Exeter, a quantity of worn and cast-off types, he commenced operations, having no one to assist him except his female servant, and having of course to perform alternately the offices of compositor and pressman. Yet in this manner did the ingenious and persevering man, sustained by the anticipation of the literary fame awaiting him, proceed until he had printed off forty copies of the first three hundred pages, his press only permitting him to do a single page at a time. Confident that he had now produced so ample a specimen of the work as would be certain to secure for it the general patronage of the learned, he here suspended his labours for a while; and having forwarded copies to the Royal Society, the universities, certain of the bishops, and the editors of the principal reviews, waited with eager expectation for the notice and assistance which he conceived himself sure of receiving from some of these quarters. He waited, however, in vain; the looked-for encouragement came not. Still, although thus a second time disappointed, he was not to be driven from his purpose, but returned with unabated courage to his neglected labours. He no doubt thought that posterity would repair the injustice of his contemporaries. In one respect, however, he determined to alter his plan. His presents to the bishops, critics, and learned bodies, had cost him twenty-six of his forty copies; and for the completion of these, so thanklessly received, he naturally enough resolved that

he would give himself no further trouble, but limit the impression of the remainder of the work, so as merely to complete the fourteen copies which he had reserved, in this way saving both his labour and his paper. And he had at last, after thirteen years of unremitting toil, the gratification of bringing his extraordinary undertaking to a conclusion. The book, when finished, the reader will be astonished to learn, extended to no fewer than twenty-six volumes 8vo., of nearly 500 pages each! In a like spirit of independence he next bound all the fourteen copies with his own hands; after which he proceeded in person to London, and deposited one in each of the principal public libraries there. We may smile at so preposterous a dedication of the labours of a life-time as this; but, at least, the power of extraordinary perseverance was not wanting here, nor the capability of being excited to arduous exertion, and long sustained under it, by those motives that act most strongly upon the noblest natures—the consciousness of honourable pursuit, and a trust in the verdict of posterity. It is true this temper of mind might have been more wisely exercised; and the patience, ingenuity, and toil which were expended upon a performance of no great use in itself, bestowed upon something better fitted to benefit both the zealous labourer and his fellow-men. Yet this consideration does not entitle us to refuse our admiration to so rare an example of the unwearied and inflexible prosecution of an object, in the absence of all those vulgar encouragements which are generally believed and felt to be so indispensable.*

* There is a short notice of Mr. Davy in the 'Quarterly Review,' vol. viii. and another containing some additional particulars in Gorton's 'Biographical Dictionary;' but the account that has been here given is principally from the communication of a valued correspondent, to whom the reverend gentleman was known. "A few years after the completion of his work," continues our authority, "I became acquainted with him. Though advanced in years, and much disappointed at the neglect he conceived he had experienced, he still hoped that a time would come when his labours would be noticed. His genius was decidedly mechanical,

There is nothing more depressing to the spirit than protracted exile or imprisonment; yet we have many instances of the successful pursuit of literary labours under these heavy inflictions. The case of OVID will occur to the recollection of many of our readers. He spent the last years of his life in banishment among the barbarians inhabiting the inhospitable coast of the Black or Euxine Sea, whither he was sent after being stripped of his possessions at Rome by the Emperor Augustus, one of the vilest tyrants that ever lived, and whose almost single good quality was his patronage of letters. For a long time despair was the only feeling which the mind of the poet could indulge after his changed fortunes; but he rose at last above the pressure of his deprivations, and some of the finest works that he has left us were written

and his industry great. He had formed a curious garden among the rocks close to his house, and his health and strength were unabated. He showed me the only copy of his work in his possession. It was a curious one, being interspersed with manuscript remarks. The printing was not elegant, but fair and legible. He still entertained hopes that the whole would be reprinted, as well as an index which he had completed to it in two volumes. In the year 1823 he recommenced his printing, and worked off a new volume of sermons; and in 1825, he published at Exeter, an abridgment of his system of divinity in two volumes, being then in his eighty-second year. [These volumes, however, the first of which contains a print of the author, were not, we believe, printed by himself.] In the following year he was presented by the Bishop of Exeter to the vicarage of Winckleigh, Devon. He was exceedingly gratified by this circumstance, and, contrary to the wishes of his friends, he removed to his living. The exertion was too much for him, and he died on the 13th of June, 1826, in his eighty-third year, and is buried at Winckleigh, having possessed his living only a few months. Having acquired some property during the latter part of his life, he founded a school for the poor at Lustleigh, and endowed it with a meadow, worth about three hundred pounds. He likewise subscribed towards building a school-room, and gave some handsome communion plate to the Church."

in that abode of universal rudeness and desolation, for which he had been obliged so suddenly to exchange the splendid and luxurious capital of the world. He even learned the language of the Getae, among whom he lived; and, as he tells us himself, took the trouble of composing a poem in that barbaric tongue, which procured him unmeasured admiration from his new associates. Ovid never again beheld his family or native country, but died among the Getae after an exile of seven or eight years, and in the fifty-ninth year of his age. We have mentioned in a former chapter the translation, by our own Alfred the Great, of BOETHIUS'S 'Consolations of Philosophy.' This beautiful treatise was written in the beginning of the sixth century by Boethius, while confined under sentence of death in the tower of Pavia, and when he was not even allowed the use of books. In more modern times, BUCHANAN, as we have already stated, commenced his elegant Latin version of the Psalms, while lying in prison at Coimbra, in Portugal; and Don Quixote was written in a dungeon, to which an unjust judgment had consigned its great author. TASSO was shut up in a cell of the monastery of St. Anne, at Ferrara, under the imputation of being deranged, when he produced several of the ablest of his minor pieces both in prose and verse. An English poetical composition of great power, entitled 'A Song of David,' which was reprinted a few years ago, and attracted considerable notice, in consequence of a resemblance which some stanzas of it were conceived to present to a celebrated passage in one of Lord Byron's works, was written by its author, CHRISTOPHER SMART, with charcoal on the walls of his cell, while confined in a mad-house. The learned JEROME MAGGI, who occupied a high situation under the Venetian government in the island of Cyprus, when it was attacked and taken by the Turks in 1571, contrived, during the captivity to which he was afterwards subjected by the conquerors, to write his two Latin works, entitled 'On Bells,' and 'On the Wooden Horse,' both displaying great erudition. He was altogether deprived of books, and obliged to toil so constantly the



Torquato Tasso.

whole day, that the only leisure he had was what he stole from the hours allotted him for sleep; and his life was spared only for about a year by his barbarous jailors, who at last finished their cruelties by strangling him in his dungeon. The French translation of the Scriptures, in thirty-two volumes, octavo, by LE MAISTRE, or SACI, as he chose to call himself by a transposition of his Christian name Isaac, or Isac, was commenced by the author while confined in the Bastille; the New Testament and a considerable part of the Old having been finished by him in the three years and a half during which his imprisonment lasted. LORENZO LORENZINI, a learned Italian who lived in the early part of the last century, is said to have relieved the weariness of an imprisonment of nearly twenty years by the composition of a work on Conic Sections. Our countryman, the famous WILLIAM PRYNNE, after having been condemned to imprisonment

for life (from which, however, he was subsequently released), continued to write as actively and with as unconquered a spirit as he had done while at liberty. The celebrated Mad. ROLAND, who perished in the storm of



Madame Roland.

the French Revolution, wrote her Memoirs (afterwards published under the title of 'Appel à l'Impartiale Postérité') during the two months she spent in prison immediately before her execution, while her own fate was full in her view, and that of her husband, to whom she was tenderly attached, and who so soon followed her, was in suspense; and yet the manuscript, it has been remarked, scarcely exhibits an erasure.

Another name which naturally suggests itself to us under this head is that of our celebrated countryman, SIR WALTER RALEIGH, whose 'History of the World' is perhaps the greatest literary work ever accomplished

under the circumstances we are now considering. He was one of those rare and wonderful men who, supereminently endowed both with the reflective and active powers, seem equally qualified to distinguish themselves in studious solitude and on the theatre of affairs. His life was a busy one from his earliest years, having been passed chiefly in the camp and on ship-board, amid the toils and agitations of war, and every other variety of daring and hazardous adventure. Yet thus occupied, it was his custom to spend four hours every day in reading and study, only five being given to sleep. The duties of his situation, and the exercises he underwent to improve himself in his profession, employed the rest of his time. The first part of his 'History of the World' appeared when its illustrious author was sixty-two years of age, having been written in the Tower, to which he had been consigned more than ten years before, after a trial on a charge of high-treason, which violated all the customary forms of legal procedure, as well as the rules of natural justice. All the time during which he was employed in composing the work, he was lying under that sentence of death which, a few years after his book was finished, was carried into execution by a singularly barbarous perversion of law. He had in the interim, as is well known, been not only liberated from confinement, but restored to public employment, and thus, by implication at least, pardoned, when advantage was taken of his condemnation fifteen years before to destroy him for his commission of certain other alleged offences, for which he was never brought to trial. Yet, although at last the victim of an iniquitous conspiracy, it was his own immoderate ambition that led this great man to his ruin. But for this "infirmity of noble minds," he was one of the very chief glories of an age crowded with towering spirits. His History is very precious as one of the classical works of our language; exhibiting in its style one of the most perfect models we possess of that easy but vigorous and graphic eloquence, which testifies both the learning of the scholar and a mind fertilized by converse with the living world. It was the largest, but not the only literary

performance with which he occupied the hours of his long imprisonment of twelve years, a period of his life during which he may be said, through these labours, to have earned his best and most enduring renown.



Sir Walter Raleigh.

The unfortunate LADY JANE GREY, and her equally unfortunate, but most guilty, cousin, QUEEN MARY of Scotland, both solaced hours of captivity, destined to

terminate only on the scaffold, by learned labours. The ancestor of the latter, JAMES I. of Scotland, one of the most amiable and accomplished of princes, having been in his twelfth year taken captive on his way to France by one of the ships of the King of England, was detained by him in close confinement for nearly twenty years, having been lodged in the first instance in the Tower, afterwards in the Castle of Nottingham, and eventually in that of Windsor. It was while in this last-mentioned prison that he wrote his beautiful allegory, 'The King's Quhair,' certainly the finest poem that had been yet produced in the English language, with the exception of the immortal works of Chaucer. It was occasioned by his passion for the lady Joanna Beaufort, a young person of distinguished beauty, and nearly allied to the royal family, whom he afterwards married, and of whom he became enamoured by beholding her from the window of his apartments walking in the Gardens of the Castle. But as another of our poets, the elegant LOVELACE, has beautifully said, writing also from a place of confinement;—

“ Stone walls do not a prison make,
Nor iron bars a cage;
Minds innocent and quiet take
That for an hermitage.”

CHAPTER XVII.

Natural defects overcome. Demosthenes; De Beaumont; Navarete; Saunderson; Rugendas; Diodotus; Didymus; Eusebius; Nicaise; De Pagan; Galileo; Euler; Moyes.



Demosthenes. From an antique bust.

STILL more depressing than any of those deprivations which we have yet considered, are such natural inflictions as close up altogether some one or more of the ordinary avenues by which knowledge finds its way into the mind; and thus seem to oppose an almost insurmountable ob-

stacle to the pursuit, perhaps, of the very studies in which the intellectual powers, thus cramped or darkened, might otherwise have been best fitted to excel. Several instances might be mentioned, in which individuals, strongly attached to a particular path of ambition, have, by mere perseverance, entirely overcome the slighter impediments presented by physical malconformation. Thus, for example, **DEMOSTHENES** strengthened a weak voice, and cured his natural indistinctness of articulation, by exercising himself in declamation while ascending the brow of a hill, or walking amid the noise of the waves along the sea-shore. Others have contrived to prosecute certain professional employments with distinguished success, under disadvantages of this sort which no discipline could cure. The French Advocate **ELIE DE BEAUMONT**, after having been educated for the bar, found his voice so weak, as completely to prevent his making any figure as a speaker ; but by devoting himself to the writing of memorials for his clients, he soon established for himself the most brilliant reputation as a master both of law and eloquence. The celebrated Spanish painter, **FERNANDEZ NAVARETE**, was seized with an illness, when only two years old, which left him deaf and dumb for life. Yet in this state he displayed from his infancy the strongest passion for drawing, covering the walls of the apartments with pictures of all sorts of objects, done with charcoal ; and having afterwards studied under Titian, he became eventually one of the greatest artists of his age. Navarete, who flourished in the sixteenth century, could both read and write, and even possessed considerable learning.

Blindness, however, is the calamity that seems most effectually to shut the mind up from the acquisition of knowledge. Yet we have many examples of the attainment of distinguished eminence in intellectual pursuits, under this severe deprivation. Of these we shall now proceed to lay a few of the more remarkable before our readers.

NICHOLAS SAUNDERSON was born at the village of **Thurston**, in **Yorkshire**, in 1682. He was only a year old, when he was deprived, by small-pox, not only of his sight, but even of his eyes themselves, which were de-

stroyed by abscess. Yet it was probably to this apparent misfortune that Saunderson chiefly owed both a good education, and the leisure he enjoyed, from his earliest years, for the cultivation of his mind and the acquisition of knowledge. He was sent when very young to the free-school at Penniston, in the neighbourhood of his native place ; and here, notwithstanding the mighty disadvantage under which it would seem that he must have contended with his schoolfellows, he soon distinguished himself by his proficiency in Greek and Latin. It is to be regretted that we have no account of the mode of teaching that was adopted by his master in so singular a case, or the manner in which the poor boy contrived to pursue his studies in the absence of that sovereign organ to which the mind is wont to be chiefly indebted for knowledge. Some one must have read the lesson to him, till his memory, strengthened by the habit and the necessity of exertion, had obtained complete possession of it, and the mind, as it were, had made a book for itself, which it could read without the assistance of the eye. At all events, it is certain that the progress he made in this part of his education was such as is not often equalled, even by those to whom nature has given all the ordinary means of study ; for he acquired so great a familiarity with the Greek language, as to be in the habit of having the works written in it read to him, and following the meaning of the author as if the composition had been in English, while he shewed his perfect mastery over the Latin, on many occasions in the course of his life, by both dictating and speaking it with the utmost fluency and command of expression.

These acquirements were due of course, in a great measure, to an excellent memory, which again owed, no doubt, much of its power and aptitude to the very difficulties under which it was obliged to exert itself. Every one of our faculties, corporeal and mental, is to a certain extent weakened, or at least prevented from reaching its utmost possible vigour and development, by the assistance it usually receives in its labours from other faculties. Individuals deprived of the use of their hands have

learned to write and paint with their toes ; no reason in the world, certainly, why those in possession of the fitter and more natural instrument should relinquish it for the other, but yet an evidence of how much more some of our members are capable of performing, and may be made by a certain discipline to perform, than we generally suppose. The German painter, RUGENDAS, celebrated for the spirit of his battle-pieces, was originally an engraver, but was obliged to abandon that profession in consequence of a weakness in his right hand, which, however, permitted him to manage the pencil, although not the burin, and accordingly he applied himself to painting. But, some years after, his disease increased so much, that, even for the lighter work it had now to do, his right hand became quite unserviceable ; and he would have been without a profession, or any means of subsistence at all, if he had not determined to make his left hand supply the place of its disabled companion. The experiment, after being persevered in for some time, succeeded perfectly, and he came at last to use the one hand with more ease and effect than he had ever done the other.

Any one of us, it is obvious from this, might acquire for himself two right hands instead of one, if he thought it worth his while, and chose to take the requisite pains. And the same rule holds as to the other organs and higher faculties. The peculiar attribute of the eye is to distinguish colours ; there is none of its other functions which may not be performed by some one or more of the other senses. But yet it does commonly serve us in a variety of other ways ; or rather by means of the power it possesses of distinguishing colours, it is able better than any of the other senses to do us certain services which yet they also might be made to perform. However convenient this arrangement may be in most respects, it is not unattended with disadvantages. If we did not possess the faculty of sight, or never opened our eyes except when we wanted merely to distinguish colours, many of our other senses and faculties would acquire a degree of power of which we have scarcely any conception. We derive more knowledge of the external world from the

eye, than from all our other senses put together; for it is its power of distinguishing colours which we chiefly make use of to measure every variety of distance, form, and motion, which objects assume, and of many of them to ascertain even a multitude of other qualities. Above all, it is by this simple power of distinguishing colours that we read books, and are enabled to drink our fill from these most abounding fountains of knowledge and reflection. But even without the eye, we should not be altogether destitute of the means of forming an acquaintance with the things around us. We should only have to make our other faculties do more than they now do. Our touch would detect inequalities in surfaces that now feel to us perfectly smooth; our taste and smell would acquire a delicacy and power of discernment, which would enable them to intimate to us, with exactness, the presence or approach of many bodies and substances, by which they are now scarcely affected; our hearing would come to their aid with a fineness of perception and discrimination that would tell the direction and distance of every sound and measure with ease, and instinctively, differences of tone which at present only the closest attention can render sensible to the acutest ear. Undoubtedly we derive all this knowledge with infinitely greater convenience through the medium of the eye, than we should do by this augmentation of the powers of our other senses, which, if so invigorated, would probably occasion us no little annoyance and discomfort, in conveying to us the information we sought from them—to say nothing of the extremely inferior degree of service they would after all render us as compared with that which we receive from the eye. But the consideration of these sleeping capabilities which are in us (beside its importance in a philosophic point of view), ought not to be without its use in shewing us, should we be deprived of the most valuable of our bodily organs, what resources we still have for perseverance to avail itself of; and perhaps also in exciting us to bestow a little more pains than we ordinarily do in what we may call the education of those of our natural powers, which, however susceptible of being put to pro-

fitable exercise, we are apt to allow to remain inactive, merely because we do not find it absolutely necessary to make a call upon them for their services.

What has been stated may teach us at least how much more efficient we might make almost any one of our faculties, by subjecting it to the proper discipline. They are all invigorated by the habit of exertion. And more especially may the memory be rendered, by judicious cultivation, both quick and retentive, to a degree of which its ordinary efficiency seems to give no promise. In blind men this faculty is almost always powerful. Not having the same opportunities which others enjoy of frequent or long-continued observation in regard to things with which they wish to make themselves acquainted, or of repeated reference to sources of information respecting them (their knowledge coming to them mostly in words, and not through the medium of the eye, which in general can both gather what it may desire to learn more deliberately, and recur at any time for what may have been forgotten to some permanent and ready remembrancer), they are obliged to acquire habits of more alert and watchful attention than those who are beset by so many temptations to an indolent and relaxed use of their faculties, as well as to give many matters in charge to their memory which it is not commonly thought worth while to put it to the trouble of treasuring up. Their reward for all this is an added vigour of that mental power, proportioned to the labour they give it to perform. But any one of us might improve his memory to the same extent by a voluntary perseverance in something like the same method of discipline in regard to it, to which a blind man is obliged to resort. The memory is not one of the highest faculties of the mind, but it is yet a necessary instrument and auxiliary, both in the acquisition and application of knowledge. The training, too, it may be observed, which is best adapted to augment its strength, is exactly that which, instead of being hurtful to any of our other faculties, must be beneficial to them all.

On being brought home from school, young Saunderson was taught arithmetic by his father, and soon evinced as

remarkable an aptitude for this new study as he had done for that of the ancient languages. A gentleman residing in the neighbourhood of his native village gave him his first lessons in geometry; and he received additional instruction from other individuals, to whose notice his unfortunate situation and rare talents introduced him. But he soon got beyond all his masters, and left the most learned of them without anything more to teach him. He then pursued his studies for some time by himself, needing no other assistance than a good author and some one to read to him. It was in this way he made himself acquainted with the works of the old Greek mathematicians, Euclid, Archimedes, and Diophantus, which he had read to him in the original.

But he was still without a profession, or any apparent resource by which he might support himself through life, although he had already reached his twenty-fourth or twenty-fifth year. His own wish was to go to the university; but the circumstances of his father, who held a place in the excise, did not enable him to gratify this ambition. At last, however, it was resolved that he should proceed to Cambridge, not in the character of a student, but to open classes for teaching mathematics and natural philosophy. Accordingly, in the year 1707, he made his appearance in that university, under the protection of a friend, one of the fellows of Christ's College. That Society, with great liberality, immediately allotted him a chamber, admitted him to the use of their library, and gave him every other accommodation they could for the prosecution of his studies. It is to be recorded, likewise, to the honour of the eccentric Whiston, who then held the Lucasian Professorship of Mathematics in the University (a chair in which he had succeeded Sir Isaac Newton, having been appointed at the express recommendation of that great man), that, on Saunderson opening classes to teach the same branches of science upon which he had been in the habit of reading lectures, he not only shewed no jealousy of one whom a less generous mind might not unnaturally have regarded as a rival and intruder, but exerted himself, in every way in his power,

to promote his success. Saunderson commenced his prelections with Newton's Optics. The Newtonian philosophy was as yet only beginning to attract attention among the learned at Cambridge. Whiston himself informs us, in that curious production called his Memoirs, that his own attention had been first strongly excited to the Principia by a paper written by Dr. Gregory (nephew of the celebrated James Gregory, whom we have already mentioned), when professor at Edinburgh, "wherein," says he, "he had given the most prodigious commendations to that work, as not only right in all things, but in a manner the effect of a plainly divine genius; and had already caused several of his scholars to keep Acts, as we call them, upon several branches of the Newtonian philosophy; while we at Cambridge, poor wretches! were ignominiously studying the fictitious hypothesis of the Cartesian, which Sir Isaac Newton had also himself done formerly, as I have heard him say."

The subject itself which Saunderson chose, independently of the manner in which he treated it, was well calculated to attract notice, few things seeming at first view more extraordinary than that a man who had been blind almost from his birth should be able to explain the phenomena and expound the doctrines of light. The disadvantage under which Saunderson laboured here, however, was merely that he did not know experimentally the peculiar nature of the sensations communicated by the organ of vision. There was nothing in this to prevent him from apprehending perfectly the laws of light—that it moves in straight lines—that it falls upon surfaces and is reflected from them at equal angles—that it is refracted, or has its course changed, on passing from one medium into another of different density—that rays of different colours are so refracted in different degrees; and the consequences to which these primary laws necessarily lead. He was not, it is true, able to see the rays, or, rather, to experience the sensation which they produce by falling upon the eye; but, knowing their direction, he could conceive them, or represent them, by other lines, palpable to the

sense of touch, which he did possess. This latter was the way he generally took to make himself acquainted with any geometrical figure. He had a board with a great number of holes in it, at small and regular distances from each other; and on this he easily formed any diagram he wished to have before him, by merely fixing a few pins in the proper places; and extending a piece of twine over them to represent the lines. In this manner, we are told, he formed his figures more readily than another could with a pen and ink. On the same board he performed his calculations, by means of a very ingenious method of notation which he had contrived. The holes were separated into sets of nine, each set forming a square, having a hole at each corner, another at the middle point of each side, and one in the centre. It is obvious that in such a figure, one pin placed at the centre might be made to stand in any one of eight different positions with reference to another pin placed on the boundary line of the square; and each of these positions might represent, either to the eye or the touch, a particular number, thus affording signs for eight of the digits. Saunderson used to employ a pin with a larger head for the central hole; so that even when it stood alone, it formed a symbol easily distinguishable from any other. Lastly, by using two large-headed pins in one of the positions, instead of one with a large and another with a small head as usual, he formed a tenth mark, and so obtained representatives for the nine digits and the cypher—all the elementary characters required, as every one knows, in the common system of notation. Here, then, were evidently the means of performing any operation in arithmetic.

In a description of this contrivance, which we have from the pen of Mr. Colson, Saunderson's successor at Cambridge, we are assured that its inventor, in making use of it, "could place and displace his pins with incredible nimbleness and facility, much to the pleasure and surprise of all the beholders. He could even break off in the middle of a calculation, and resume it when he pleased, and could presently know the condition of it by only drawing his fingers gently over the table." But

Saunderson was also wont to perform many long operations, both in arithmetic and algebra, solely by his powerful and admirably disciplined memory. And his mind, after having once got possession of even a very complicated geometrical figure, would, without the aid of any palpable symbols, easily retain a perfect conception of all its parts and reason upon it, or follow any demonstration of which it might be the subject, as accurately as if he had it all the while under his eye. It occasionally cost him some effort, it was remarked, to imprint upon his mind, in the first instance, a figure unusually intricate; but when this was once done all his difficulties were over. He seems indeed to have made use of sensible representations chiefly in explaining the theorems of science to his pupils. In the print prefixed to his Algebra, he is represented discoursing upon the geographical and astronomical circles of the globe by the assistance of an armillary sphere constructed of wood. His explanations were always remarkable for their simplicity and clearness, qualities which they derived, however, not from any tedious or unnecessary minuteness by which they were characterised, but from the skill and judgment with which he gave prominence to the really important points of his subject, and directed the attention of his hearers to the particulars most concerned in its elucidation.

His ability and success as a teacher continued and augmented that crowded attendance of pupils, which, in the first instance, he had owed perhaps principally to the mere curiosity of the public. Every succeeding University examination afforded additional evidence of the benefit derived from his prelections. His merits, consequently, were not long in being appreciated both at Cambridge and among scientific men in general. He obtained the acquaintance of Sir Isaac Newton, his veneration for whom was repaid by that illustrious philosopher with so much regard, that, when Whiston was expelled from his chair in 1711, Sir Isaac exerted himself with all his influence to obtain the vacant situation for Saunderson. On this occasion, too, the heads of colleges applied to the Crown in his behalf to issue a mandate for conferring

upon him the degree of Master of Arts, as a necessary preliminary to his election; and, their request being complied with, he was appointed to the professorship. From this time Saunderson gave himself up almost entirely to his pupils. Of his future history we need only relate that he married in 1723, and was created Doctor of Laws in 1728, on a visit of George II. to the University, on which occasion he delivered a Latin oration of distinguished eloquence. He died in 1739, in the 57th year of his age, leaving a son and daughter.

His constant labours as a teacher had left him but little time to prepare anything for the press. But an able and well-known treatise on Algebra, which he had employed his latter years in compiling, appeared in two volumes quarto the year after his death. With the exception of a work on Fluxions, and a Latin commentary on Sir Isaac Newton's 'Principia,' which were printed together several years afterwards, none of the other papers left by this eminent mathematician have yet been given to the world.

Saunderson's knowledge of the external world, as we have already observed, was principally obtained by his sense of touch, which he possessed in exquisite perfection. He could not, however, by this means distinguish colours, as it has been asserted that blind men have sometimes done; and after many efforts he became convinced that the attempt was quite impossible. But he would detect counterfeit from genuine medals with great exactness, even in cases in which able connoisseurs were deceived. He always felt a roughness on the new cast coin, although imperceptible either to the touch or the eye of others. His feeling of the changes of the atmosphere was in like manner, as might be supposed, extremely delicate. "I have been present with him in a garden, making observations on the sun," says the writer of the account of his life prefixed to his Algebra, who had been one of his intimate friends, "when he has taken notice of every cloud that disturbed our observation, almost as justly as we could. He could tell when anything was held near his face, or when he passed by a

tree at no great distance, provided the air was calm, and little or no wind; these he did by the different pulse of the air upon his face." His sense of hearing, too, was exceedingly refined; and it was thought that he might have risen to great eminence as a musician, if his geometrical talents had not withdrawn him to other pursuits. He played with great skill on the flute; but the principal advantage which he derived from the accuracy of his ear, was the means it afforded him, in the absence of a higher sense, of distinguishing not only persons by the sound of their voices, but places, distances, and the different sizes of rooms, by the echo which they returned of his own voice or his tread. To such perfection had he carried the art of interpreting these signs, which are so vague to ordinary observers, because so little noticed by them, that we are told he scarcely ever was carried a second time to any place in which he had once been, without recognising it.

Saunderson is not the only blind mathematician on record. The writer of his life, whom we have already quoted, mentions DIODOTUS the Stoic, DIDYMUS of Alexandria, EUSEBIUS, and NICASIUS DE VOERDA. Diodotus was the preceptor of Cicero in Greek literature and geometry, and, as that great philosopher himself informs us, lived many years in his house after becoming blind, giving himself to philosophy more assiduously than ever, and even continuing to teach geometry; a thing, says Cicero, which one would think scarcely possible for a blind man to do, yet would he direct his pupils where every line was to be drawn just as exactly as if he had had the use of his eyes. This was nothing, however, to what Saunderson did, who directed his pupils how to draw figures not only which he did not see, but which he had never seen. Didymus, who flourished in the fourth century, is known only as a theological writer; but we are informed by St. Jerome, who was his pupil, that, although he lost his sight at five years of age, he distinguished himself at the school of Alexandria by his proficiency not merely in grammar, rhetoric, logic, music, and arithmetic, but in the remaining two of the seven departments then con-

ceived to constitute the whole field of human learning, geometry and astronomy, sciences of which, remarks the narrator, it is scarcely conceivable how any knowledge should be obtained without the assistance of the eye. Didymus, like Saunderson, pursued his studies by employing persons to read for him. One of his disciples, Palladius, remarks, that blindness, which is to others so terrible a misfortune, was the greatest of blessings to Didymus, inasmuch as, by removing from him all objects that would have distracted his attention, it left his faculties much more at liberty than they otherwise would have been for the study of the sciences. Didymus, however, does not seem to have been himself altogether of this opinion, since we find it recorded, that when St. Anthony, who, attracted by the report of his wonderful learning and sanctity, had come from the desert to pay him a visit, put to him the question, "Are you grieved that you are blind?" although it was repeated several times, Didymus could not be prevailed upon to return any other answer than that he certainly was,—greatly to the mortification of the Saint, who was astonished that a wise man should lament the loss of a faculty which we only possess, as he chose to express it, in common with the gnats and ants. The old Greek philosopher, Democritus, who is said by some authors to have actually put out his eyes in order that he might the better fit himself for the study of philosophy, would have presented a spectacle more to the taste of Anthony.

The Eusebius mentioned above is not the celebrated ecclesiastical historian, but a person of the same name, described by Cassiodorus as an Asiatic, and eminent for his learning and his ability as a teacher, although he had lost his sight at five years of age, his right eye having become opaque, and his left being altogether destroyed. Nicasius de Voerda, or Nicaise of Vourde, taught the canon and civil law in the university of Cologne, in the fifteenth century, and is said to have possessed extraordinary erudition both in literature and science, although he had been blind from his third year. He was wont to quote with great readiness the books of which he had

acquired a knowledge only from having heard them read by others.*

To these instances we may add that of the **COUNT DE PAGAN**, who was born in the beginning of the seventeenth century, and has been accounted the father of the modern science of fortification. Having entered the army at the early age of twelve, he lost his left eye before he was seventeen, at the siege of Montauban. He still, however, pursued his profession with unabated ardour, and distinguished himself by many acts of brilliant courage. At last, when about to be sent into Portugal with the rank of Field Marshal, he was seized with an illness which deprived him of his remaining eye. He was yet only in his thirty-eighth year, and he determined that the misfortunes he had already sustained in the service of his country should not prevent him from recommencing his public career in a new character. He had always been attached to mathematics, and he now devoted himself assiduously to the prosecution of his favourite study, with a view principally to the improvement of the science of fortification, for which his great experience in the field particularly fitted him. During the twenty years after this which he passed in a state of total blindness, he gave a variety of publications to the world ; among which may

* It was the example of Nicaise de Vourde which excited another blind individual, Dr. Nicholas Bacon, to pursue the study of the law. Dr. Blacklock, in the article on the Blind which he wrote for the *Encyclopædia Britannica*, informs us that he had corresponded by letter with this gentleman, who resided in the Netherlands, but was, he says, of the same family with the Lord Chancellor Bacon. He lost his sight, when only nine years old, by a wound from an arrow ; but, having recovered his health, he determined to continue his studies as before, until, as well as Nicaise, he should obtain his degree of Doctor of Laws. Accordingly, having finished his education at school, he proceeded to college, where, having greatly distinguished himself, he in due time attained the title of which he was so ambitious, and became eventually one of the most eminent advocates in the council of Brabant.

be mentioned, besides his well-known and largest work, on Fortification, his 'Geometrical Theorems,' and his 'Astronomical Tables.' He is also the author of a rare book called 'An Historical and Geographical Account of the River of the Amazons,' which is remarkable as containing a chart asserted to have been made by himself after he was blind. It is said not to be very correct, although a wonderful production for such an artist.

The distinguished mathematician, EULER, was struck with blindness in his fifty-ninth year, his sight having fallen a sacrifice to his indefatigable application. He had literally written and calculated himself blind. Yet after this misfortune he continued to calculate, and to dictate books, at least, if not to write them, as actively as ever. His 'Elements of Algebra,' a work that has been translated into every language of Europe, [was dictated by him when blind to an amanuensis, who was only a tailor's apprentice; but who, though altogether unacquainted with algebra when he began his task, is said to have acquired a complete knowledge of that science in the course of merely taking down what Euler spoke, with such admirable clearness and simplicity is the work composed. His Algebra was followed by several other most ingenious and elaborate works, among which particularly deserve to be mentioned his 'New Theory of the Moon's Motions,' and the tables by which it was accompanied, the computation of which, by a person in Euler's situation, not only deprived of sight, but harassed by other misfortunes (for, while he was engaged on this work, his house was burned to the ground by a fire, from which he narrowly escaped with his life), cannot but be regarded as one of the most wonderful triumphs ever achieved by the energy of mind over the opposition of circumstances. But Euler affords us in every way the most remarkable example on record of activity in scientific labours. The mere catalogue which has been published of his works extends to fifty printed pages. "It may be asserted, without exaggeration," says Lacroix,* "that he composed

* Biographie Universelle.

more than one-half of the mathematical memoirs contained in the forty-six quarto volumes which the academy of Petersburg published from 1727 to 1783; and he left at his death about a hundred memoirs ready for the press, which the same academy inserts successively in the volumes it still continues to give to the world. In addition to this immense mass of productions, he composed various separate works, extremely important in respect of the subjects of which they treat, and many of them of considerable magnitude. He likewise greatly enriched the collections of the academy of Berlin, during the twenty-five years which he passed in that city. He presented several memoirs to the Academy of Sciences of Paris, the prizes offered by which he ten times succeeded in carrying or dividing; nor did he disdain to contribute to the transactions of less illustrious associations of the learned. In fine, it requires the incontrovertible evidence of facts to convince us that so many labours can all have been performed by one man, who passed the last seventeen years of his life in a state of blindness." As a proof that even this statement rather underrates than exaggerates the amazing industry and fertility of Euler, we may just add, that, in the list of his works already referred to, there are enumerated, of separate publications alone, twenty-nine volumes quarto, and two octavo, in Latin; one volume quarto, and six octavo, in German; and five volumes octavo, in French.

We may mention still another, though certainly a very inferior name, that of the late Dr. HENRY MOYES. Moyes was born at Kirkaldy, in Fifeshire, and lost his sight by small-pox, before he was three years old, so that he scarcely retained in after-life any recollection of having ever seen. Yet he used to say, that he remembered having once observed a water-mill in motion; and it is characteristic of the tendencies of his mind, that even at that early age his attention was attracted by the circumstance of the water flowing in one direction, while the wheel (having been what is called an undershot wheel) turned round in the opposite, a mystery on which he reflected for some time before he could comprehend it. Blind as

he was, he distinguished himself when a boy, by his proficiency in all the usual branches of a literary education. But "mechanical exercises," says Mr. Bew, who has given a short account of him in the first volume of the 'Memoirs of the Literary and Philosophical Society of Manchester,' "were the favourite employments of his infant years. At a very early age he made himself acquainted with the use of edged tools so perfectly, that, notwithstanding his entire blindness, he was able to make little wind-mills; and he even constructed a loom with his own hands, which still show the cicatrices of wounds he received in the execution of these juvenile exploits." Besides a knowledge of the ancient languages, and of music, he is stated by Mr. Bew, who became acquainted with him about the year 1782, to have made himself extensively conversant with Algebra and Geometry, and with Chemistry, Mechanics, Optics, Astronomy, and the other departments of Natural Science. At this time he was engaged in delivering lectures on Chemistry and Natural Philosophy in the different large towns throughout the country. He used to perform all his experiments, we are told, with his own hands, and with extraordinary neatness. Moyes possessed all that extreme delicacy in the senses of touch and hearing for which the blind have usually been remarkable. We have been told, that having been one day accosted in the street by a young friend whom he had not met with for a good many years, his instant remark, on hearing his voice, was, "How much taller you have grown since we last met!" When first brought into a company, his custom was to remain silent for a short time, until by the sound of the different voices he had made himself acquainted with the size of the room, and the number of persons in it. He was then quite at his ease, readily distinguished one speaker from another, and shone greatly himself by his powers of conversation. Although at that time not in affluent circumstances, and having indeed nothing to depend upon except the very precarious occupation to which he had betaken himself, he was remarkable for his cheerfulness and buoyant spirits. He contrived for himself a system of palpable

arithmetic, on a different principle from that of Saunderson, and possessing the advantage in point of neatness and simplicity. An explanation of it may be found in a letter from himself, inserted in the *Encyclopædia Britannica* under the article *Blind*. Dr. Moyes, who must have been a person of extraordinary mental endowments, and who affords us certainly, next to Saunderson, the most striking example on record of attainments in the Mathematics, made without any assistance from the eye, received his degree from a college in America, in which country he lectured for some years. He eventually made in this way a good deal of money ; and some time before his death had retired to the town of Pittenweem, not far from his native place, where his society was much courted. His lectures are said to have been well delivered, and his explanations were eminently perspicuous. It has been reported that he could distinguish colours by the touch ; but, as this circumstance is not mentioned in his friend Dr. Blacklock's article just referred to, we may fairly assume that he did not himself pretend to the possession of any such power.

CHAPTER XVIII.

Difficulties occasioned by Blindness conquered. Homer; Milton; Salinas; Stanley; Metcalf; Henry the Minstrel; Scapinelli; Blacklock; Anna Williams; Huber.

MATHEMATICAL investigation is, strictly speaking, merely a mental exercise, and it is certainly conceivable that every theorem man has yet demonstrated in *abstract science* might have been discovered by him without the aid of his external senses. But, on the other hand, every operation of mind is so greatly facilitated by the employment of sensible symbols, and especially the processes of acquiring, apprehending, and recollecting knowledge, as well as of pursuing long and intricate calculations or deductions, receive such important assistance from those lines, figures, letters, and other marks which may be made to present the record of every thought faithfully to the eye, that we are justified in quoting any remarkable case of progress, even in abstract science, attained without the aid of this invaluable organ, as a noble example of what perseverance may accomplish in the face of the most formidable difficulties. It is much even for the mind to rise superior to so crushing a calamity as the loss of sight, and to maintain or recover its spirit of exertion under a deprivation which may be said to take from it for ever that which nature has appointed to be at once the chief helpmate and best sweetener of its labours. It would seem almost as if life could scarcely continue desirable to him whose hourly thought may be expressed, in the language, familiar to all, of Milton's beautiful and pathetic lamentation :

“ ——— with the year

Seasons return ; but not to me returns

Day, or the sweet approach of even or morn,

Or sight of vernal bloom, or summer's rose,

Or flocks, or herds, or human face divine ;
 But cloud instead, and ever-during dark
 Surrounds me, from the cheerful ways of men
 Cut off, and, for the book of knowledge fair,
 Presented with a universal blank
 Of Nature's works, to me expunged and rased."

What an attestation to the medicinal value of intellectual labour, that it has so often cheered even such desolation as this ! and how strong must be the natural love of knowledge in the human mind, that even in the midst of such impediments to its gratification it has in so many instances so eagerly sought and so largely attained its end ! After the examples we have mentioned of individuals who in this state of blindness have distinguished themselves by their eminence in the severest exercises of the mind, it may be thought less surprising that others should, in the same condition, have devoted themselves with success to pursuits of a less laborious character, and not so rigorously taxing the attention and the memory. Poetry and music, for example, may be deemed the especially appointed occupations of the blind, as having their subject and their materials chiefly in the imagination and the affections, and being apparently better fitted to dispense with the aid of visible symbols than the intricate reasonings and calculations of science. Yet even poetry owes much of its inspiration to the eye wandering in freedom over nature ; and more to that serenity and gladness of the soul, which so heavy an affliction as the loss of sight is apt to destroy or impair. Whosoever, therefore, suffering under this doom, shall not

" ——— bate a jot
 Of heart or hope ; but still bear up and steer
 Right onward,"

be the healing and strengthening toils in which he exercises his spirit those of science or of song, still presents us with an example of heroic wisdom well worthy of our admiration.

It seems to have been the tradition of Greece, that the Iliad and Odyssey were both composed by HOMER after he

was blind, although, of course, from materials which he had collected before that misfortune befel him; for it is very evident that the author of these poems must, at one time of his life, have surveyed whatever was most interesting that the world had at that early age to show, with no dim or unobservant eye. But of Homer, in truth, we know nothing. The origin of the *Iliad* and the *Odyssey* is the most perplexing problem in literature; and Homer must, in all probability, ever remain to us a mere name. The poems themselves are Homer, and perhaps there never was another. But if

“Blind Thamyras, and blind Mæonides,
And Tiresias, and Phineus, prophets old,”

instead of being fablers themselves, were merely the creations of other fablers, the Poet of Paradise at least uttered his harmonious numbers in darkness,—as he himself expresses it,

“In darkness, and with dangers compass’d round.”

MILTON is supposed to have been in the fifty-fourth year of his age when he commenced the composition of his immortal epic, although the high theme had doubtless for some time before occupied his thoughts. At this period of his life he was quite blind, having lost his sight, which had early begun to decay, during the composition of his famous *Defence for the People of England*, in answer to *Salmasius*. He felt the calamity that was coming upon him while occupied with this work, but the apprehension did not induce him even to relax his labours; and, after the foreseen event had occurred, we find him, in one of his majestic strains, consoling himself under the extinction of his sight by the thought of the cause in which he had sacrificed it:—

“What supports me dost thou ask?
The conscience, friend, to have lost them overplied
In liberty’s defence, my noble task,
Whereof all Europe rings from side to side.”

Paradise Lost was probably only the work of three or four years, since there is reason to believe that it was completed in 1665, although not published till 1667. But this poem, as is well known, was not the only fruit of the noble intellect of Milton, while bearing up against the accumulated pressure of disease, old age, and the "evil days" on which he had fallen. Beside a mass of philological labours of extraordinary magnitude, and several political tracts, which in eloquence and power are scarcely surpassed by anything he had written in the vigour of life and health, we owe to the blind old man the Paradise Regained, and the Samson Agonistes, the not unworthy companions of his grander song. We cannot mourn over the sightless orbs of Milton; he could not have done greater things than he did in his blindness:—

"——— Samson hath quit himself
Like Samson, and heroically hath finished
A life heroic.———
Nothing is here for tears, nothing to wail,
Or knock the breast; no weakness, no contempt,
Dispraise or blame; nothing but well and fair."

[The Spanish musician, FRANCIS SALINAS, who flourished in the sixteenth century, was born blind. Nevertheless, he early distinguished himself by his proficiency, not only in music, but in the ancient languages and in science. This blind man eventually became Professor of Music in the University of Salamanca; and he published an able work in Latin on the theory of his favourite science. We had in later times, in our own country, an eminent example of musical attainments made in similar circumstances to those of Salinas. JOHN STANLEY was born in London in 1713, and lost his eyesight, when only two years old, by a fall. In this condition he applied himself with such extraordinary success to the study of music, that in his eleventh year he was chosen organist to the church of Allhallows, in Bread-street, and two years afterwards obtained the same situation in the church of St. Andrew, Holborn, although opposed by many other

candidates. From this he went, in 1734, to the Temple Church, having already, when only sixteen, taken his degree of Bachelor of Music, at Oxford. Mr. Stanley died in 1786, after having for many years stood at the head of the practitioners of sacred music in England. The names of other distinguished musical composers, who were either born blind or became so in early infancy, might be added to these.

Nor is music the only one of the fine arts in which the blind have excelled. We read of a sculptor who became blind at twenty years of age, and yet ten years afterwards made a statue of Pope Urban VIII. in clay, and another of Cosmo II. of Florence, of marble. Another blind sculptor is mentioned by Roger de Piles, in one of his works on painting; he executed a marble statue of our Charles I. with great taste and accuracy. Nor ought we to be surprised at this dexterity if we may believe what is told us of a young French lady, who lost her sight in her second year, and of whose marvellous accomplishments we have an account in the Annual Register for 1762. This lady is said, notwithstanding her blindness, to have been an excellent player at cards, a ready and elegant writer, and even to have been able to read written characters. On sitting down to play at cards, she first went over the pack, marking every one of the fifty-two cards by so light an indentation, as scarcely to be perceptible to any one else on the closest inspection, but which she herself, by the delicacy of her touch, instantly recognised. She then proceeded without difficulty, only requiring, of course, that every card should be named as it was played. In writing she used a sharp and hard-pointed pencil, which marked the paper so as to enable her to read what she had written with her finger-ends. All this, it must be confessed, seems very like a fiction; but it is, perhaps, scarcely so wonderful as what is told of an English lady, who was examined by several eminent physicians, and among others by Sir Hans Sloane. She had been deprived by disease not only of her sight, but of her powers of speech and hearing, so that there remained only the organs of touch, taste, and smell, by

which she could hold communication with others. Deaf, dumb, and blind as she was, however, she yet in course of time learned to converse with her friends by means of an alphabet made by their hands or fingers pressed in different ways upon hers. She very soon also acquired the power of writing with great neatness and exactness, and used to sit up in bed, we are told, at any hour of the night, either to write or to work, when she felt herself indisposed to sleep. We shall feel what an invaluable possession the knowledge of writing must have been to this individual, when we reflect, that, on first being reduced to the state of deplorable helplessness which she afterwards found admitted of so many alleviations, nothing but the power she still retained of scrawling a few words, which yet she could not discern, could have enabled her to communicate her wishes or feelings to those around her. But for this power it would seem that she must have been for ever shut out from even the most imperfect intercourse with her species; for it was through it alone that she could intimate to them the meaning she wished to be assigned to each of the different palpable signs which constituted her alphabet. With this instrument of communication, the arrangement would be easily effected; it would otherwise have been impracticable. We have abundant reason to set a high value on the art of writing, but to this person it was invaluable. To us it is the most useful of all the arts; to her it was the means of restoration to life from a state of exclusion, almost as complete as that of the grave.

But perhaps the most singular instance on record of a blind person triumphing over those difficulties of his situation which are apparently most insuperable is afforded in JOHN METCALF, or, as he was commonly called, Blind Jack, a well-known character, who died only a few years ago. This person was a native of Manchester or the neighbourhood, and Mr. Bew has given an account of him in the paper we have already quoted. After telling us that he became blind at a very early age, so as to be entirely ignorant of light and its various effects, the narrative proceeds as follows:—"This man passed the younger part of his life as a waggoner, and occasionally

as a guide in intricate roads during the night, or when the tracks were covered with snow. Strange as this may appear to those who can see, the employment he has since undertaken is still more extraordinary; it is one of the last to which we could suppose a blind man would ever turn his attention. His present occupation is that of projector and surveyor of highways in difficult and mountainous parts. With the assistance only of a long staff, I have several times met this man traversing the roads, ascending precipices, exploring valleys, and investigating their several extents, forms, and situations, so as to answer his designs in the best manner. The plans which he designs, and the estimates he makes, are done in a method peculiar to himself, and which he cannot well convey the meaning of to others. His abilities in this respect are nevertheless so great, that he finds constant employment. Most of the roads over the Peak in Derbyshire have been altered by his directions, particularly those in the vicinity of Buxton; and he is at this time constructing a new one betwixt Wilmslow and Congleton, with a view to open a communication to the great London road, without being obliged to pass over the mountains." Mr. Bew adds in a note, "Since this paper was written, and had the honour of being delivered to the Society, I have met this blind projector of the roads, who was alone as usual, and, amongst other conversation, I made some inquiries concerning this new road. It was really astonishing to hear with what accuracy he described the courses and the nature of the different soils through which it was conducted. Having mentioned to him a boggy piece of ground it passed through, he observed, that that was the only place he had doubts concerning; and that he was apprehensive they had, contrary to his directions, been too sparing of their materials." *

We will mention, in conclusion, only a very few others of the blind who have distinguished themselves in lite-

* Memoirs of the Literary and Philosophical Society of Manchester, vol. i.

rature. The Scotch poet sometimes designated HENRY the Minstrel, better known as "Blind Harry," who has left a poem of great extent on the achievements of Sir William Wallace, is said to have been born blind. In addition to his poetical powers, which are considerable, he seems to have possessed a knowledge of Latin and French, as well as of the principal sciences cultivated in his time. His work shews him to have had some acquaintance in particular both with divinity and astronomy. He flourished about the middle of the fifteenth century; and John Major, the historian, in whose youth he was still alive, tells us, that he was wont to recite his verses at the feasts of the nobility, "obtaining in that manner," he adds, "his food and raiment, of which he was well worthy." Henry's work long continued a popular favourite in Scotland, and is still very generally read in a modernised form. The Italian poet SCAPINELLI, who was born at Modena in 1585, was also blind from his birth. He held a Professor's chair successively at Bologna, Modena, and Pisa; and, having then been recalled to occupy the place of Chief Professor of Eloquence, on which he had long set his heart, in the first of these universities, died there in the forty-ninth year of his age. Scapinelli, besides several prose compositions, wrote verses both in Italian and Latin; and all his works are distinguished, not only by their learning, but by a purity and elegance of diction, rare at the time when he flourished. He was accounted, indeed, one of the most finished scholars of his day.

Nor must we forget here the well-known name of the Rev. Dr. BLACKLOCK. He was born at the town of Annan, in Dumfries-shire, in 1721. When no more than six months old, he was reduced to a state of complete blindness by small-pox. To one in his circumstances this was a peculiarly heavy calamity; for his father was only a poor working mason, with several other children to provide for, and but little in a condition, therefore, to sustain the burden of a son, not only left more than usually dependent upon him during childhood, but seemingly unfitted for ever taking care of himself. But never

were the duties of a father more admirably fulfilled than by this excellent man in his humble estate. His poor blind boy was the object of an unceasing tenderness and care, which, not satisfied with providing for the supply of his bodily wants, left nothing undone that could contribute either to improve or amuse his mind, and so make up to him, as far as possible, for his melancholy deprivation. He delighted especially to spend his leisure hours in reading to him ; and, finding him fond of poetry, he procured as many of the works of our English poets as he could, and thus nourished in him a passion which afterwards became one of the chief consolations of his life. In this way young Blacklock became a versifier himself at a very early age, some of his poems which were afterwards published being dated in his twelfth year. He had before this, however, been sent to school, where, in course of time, he became a tolerable proficient in the common branches of education, and even made considerable progress in the knowledge of the Latin language. He was very much indebted, in making these attainments, to the assistance of his schoolfellows, to all of whom his gentle and yet lively and playful disposition, as well as his helplessness, greatly endeared him. At last, however, in his nineteenth year, he lost his inestimable father. Helpless as he was, and rendered more so than he would otherwise have been from the very excess of care he had heretofore experienced, he was now left apparently without a friend on earth from whom he could expect a continuation of the attentions he so much needed ; and the prospect before him was as gloomy as it is possible to imagine. He has expressed the feelings with which he looked forward to the future at this time in some very pathetic verses, which are to be found among his printed poems. He was not, however, left long without a protector. His case having reached the ear of Dr. Stephenson, one of the Medical Professors in the University of Edinburgh, that gentleman generously invited him to come to the Scottish metropolis, where he engaged to find him the means of pursuing his studies at College. Blacklock gladly accepted this liberal offer. While in

Edinburgh, he availed himself with eagerness of every opportunity of improvement which presented itself. Thus, for instance, he acquired a familiarity with the French language, by conversing with a lady of his acquaintance, who was a native of France. When he had been a few years at the university, he published, at the suggestion of his friends, a volume of poems; and this attracted to him the more general notice of the literary world. Among others whose attention was drawn to the productions of the blind poet was Mr. Spence, Professor of Poetry at Oxford, who published a critical review of them, accompanied by a sketch of their author's history, which had a great effect in making him more extensively known. In the meanwhile, Blacklock continued his studies at Edinburgh, until he had finished the usual course of education prescribed to candidates for the ministry in the Scotch Church, which occupied him ten years. In 1754 a second edition of his poems was published by subscription; and, having been a few years afterwards licensed by the Presbytery as a preacher, he was inducted to the church of Kirkcudbright, on the presentation of the Earl of Selkirk. So much opposition, however, was made by the inhabitants of the place to this arrangement for giving them a blind clergyman, that Blacklock was soon induced to resign his appointment for a small annuity. With this provision he returned to Edinburgh; and, being now married, opened an establishment for receiving boarders, whose studies he proposed to superintend. In this occupation, and in a variety of literary pursuits, he spent his remaining life, and died at Edinburgh in 1791. He had received the degree of Doctor of Divinity in 1766, and may be said to have eventually attained a highly respectable place among the literary characters of his time, although his poetry does not indicate a great deal of power. He possessed, however, we are told, wonderful facility in verse-making, and used sometimes to dictate thirty or forty verses to his friends almost as fast as they could be written down. His chief enjoyments were conversation and music; and, although not unvisited by occasional depression of spirits, he was generally cheerful,

and seemed, indeed, to enjoy life as much upon the whole as any of his friends whom nature had more bountifully endowed. One of the most interesting of Dr. Blacklock's productions is his paper, to which we have already more than once referred, on the Blind, in the *Encyclopædia Britannica*. He produced, also, a few other performances in prose of greater extent.

At this time, too, lived a female writer of verses, who was also blind, Miss ANNA WILLIAMS. This lady came to London in 1730, when only twenty-four years of age, with her father, a Welsh surgeon, who had given up his profession in consequence of imagining that he had discovered a method of finding the longitude at sea, which would make his fortune. After many efforts, however, to obtain the patronage of Government for his scheme, and having exhausted his resources, he was obliged to take refuge in the Charter-house. His daughter, who had been liberally educated, and had at first mixed in all the gaieties of the metropolis, was now obliged to support both him and herself by working at her needle. But, after struggling in this way for some years, she lost her sight by a cataract. Her situation, it might be imagined, was now both helpless and hopeless in the extreme; but a strong mind enabled her to rise above her calamity. She not only continued the exercise of her needle, we are told, with as much activity and skill as ever, but, never suffering her spirits to droop, distinguished herself just as she had been used to do, by the neatness of her dress, and preserved all her old attachment to literature. In 1746, after she had been six years blind, she published a translation from the French of La Bleterie's 'Life of the Emperor Julian.' Her father having some time after this met with Dr. Johnson, told him his story, and, in mentioning his daughter, gave so interesting an account of her, that the Doctor expressed himself desirous of making her acquaintance, and eventually invited her to reside in his house as a companion to his wife. Mrs. Johnson died soon after; but Miss Williams continued to reside with the Doctor till her death, in 1783, at the age of 77. In 1752 an attempt was made to restore her sight by the

operation of couching, but without success. We find her father publishing, three years later, an account of his method for discovering the longitude; and about the same time Garrick gave the daughter a benefit at Drury Lane, which produced her two hundred pounds. Miss Williams also appeared again as an authoress in 1766, when she published a volume, entitled, 'Miscellanies in Prose and Verse,' written partly by herself and partly by several of her friends.



David Garrick.

One of the most ingenious and original works ever written upon the habits and natural history of insects is the 'Recherches sur les Abeilles' of M. HUBER of Geneva, who had been reduced to a state of complete blindness by *gutta serena*, at the age of seventeen. He was

assisted in his observations by his wife, an admirable woman, who made it the business of her life to contrive the means of alleviating her husband's misfortune, and for whom, indeed, it has been said, he was indebted chiefly to his blindness ; as, although an attachment had existed between them previously, the lady's friends were so much opposed to the match that she would probably have been induced to listen to the addresses of another suitor, had not Huber's helpless condition awakened a sympathy she could not resist, and determined her, at all hazards, to unite herself to him. Madame Ducrest, who, in her late *Memoirs of the Empress Josephine*, relates this anecdote, knew M. Huber and his wife ; and nothing, she assures us, could exceed either the unwearied attention of the latter to every wish and feeling of her husband, or the happiness which, notwithstanding his blindness, he seemed in consequence to enjoy. During the war, we are told, Madame Huber used to put her husband in possession of the movements of the armies by arranging squadrons of pins on a map, in such a manner as to represent the different bodies of troops. A method was also invented by which he was enabled to write ; and his wife used to form plans of the towns they inhabited, in relief, for him to study by the touch. In short, so many ways did her affection find of gladdening his darkened existence, that he was wont to declare he should be miserable were he to cease to be blind. "I should not know," said he, "to what extent a person in my situation could be beloved ; besides, to me my wife is always young, fresh, and pretty, which is no light matter." *

* *Mémoires sur Josephine*, tom. 1.

CHAPTER XIX.

Account of James Brindley ; Canals.

JAMES BRINDLEY, the celebrated engineer, was entirely self-taught in even the rudiments of mechanical science, although, unfortunately, we are not in possession of any very minute details of the manner in which his powerful genius first found its way to the knowledge of those laws of nature of which it afterwards made so many admirable applications. He was born at Tunsted, in the parish of Wormhill, Derbyshire, in the year 1716 ; and all we know of the first seventeen years of his life is, that, his father having reduced himself to extreme poverty by his dissipated habits, he was allowed to grow up almost totally uneducated, and, from the time he was able to do anything, was employed in the ordinary descriptions of country labour. To the end of his life this great genius was barely able to read on any very pressing occasion ; for, generally speaking, he would no more have thought of looking into a book for any information he wanted than of seeking for it in the heart of a millstone : and his knowledge of the art of writing hardly extended farther than the accomplishment of signing his name. It is probable, that as he grew towards manhood he began to feel himself created for higher things than driving a cart or following a plough ; and we may even venture to conjecture that the particular bias of his genius towards mechanical invention had already disclosed itself, when, at the age of seventeen, he bound himself apprentice to a person of the name of Bennet, a millwright, residing at Macclesfield, which was but a few miles from his native place. At all events, it is certain that he almost immediately displayed a wonderful natural aptitude for the profession he had

chosen. "In the early part of his apprenticeship," says the writer of his life in the 'Biographia Britannica,' who was supplied with the materials of his article by Mr. Henshall, Brindley's brother-in-law, "he was frequently left by himself for whole weeks together, to execute works concerning which his master had given him no previous instructions. These works, therefore, he finished in his own way; and Mr. Bennet was often astonished at the improvements his apprentice from time to time introduced into the millwright business, and earnestly questioned him from whom he had gained his knowledge. He had not been long at the trade, before the millers, wherever he had been employed, always chose him again in preference to the master, or any other workman; and before the expiration of his servitude, at which time Mr. Bennet, who was advanced in years, grew unable to work, Mr. Brindley, by his ingenuity and application, kept up the business with credit, and even supported the old man and his family in a comfortable manner."

His master, indeed, from all that we hear of him, does not appear to have been very capable of teaching him much of anything; and Brindley seems to have been left to pick up his knowledge of the business in the best way he could, by his own observation and sagacity. Bennet having been employed on one occasion, we are told, to build the machinery of a paper-mill, which he had never seen in his life, took a journey to a distant part of the country expressly for the purpose of inspecting one which might serve him for a model. However, he had made his observations, it would seem, to very little purpose; for, having returned home and fallen to work, he could make nothing of the business at all, and was only bewildering himself, when a stranger, who understood something of such matters, happening one day to see what he was about, felt no scruple in remarking in the neighbourhood that the man was only throwing away his employer's money. The reports which in consequence got abroad soon reached the ears of Brindley, who had been employed on the machinery under the directions of his master. Having probably of himself begun ere this to suspect that all

was not right, his suspicions were only confirmed by what he heard ; but, aware how unlikely it was that his master would be able to explain matters, or even to assist him in getting out of his difficulties, he did not apply to him. On the contrary, he said nothing to any one ; but, waiting till the work of the week was over, set out by himself one Saturday evening to see the mill which his master had already visited. He accomplished his object, and was back to his work by Monday morning, having travelled the whole journey of fifty miles on foot. Perfectly master now of the construction of the mill, he found no difficulty in going on with his undertaking ; and completed the machine, indeed, not only so as perfectly to satisfy the proprietor, but with several improvements on his model of his own contrivance.



James Brindley.

After remaining some years with Bennet, he set up in business for himself. With the reputation he had already

acquired, his entire devotion to his profession, and the wonderful talent for mechanical invention, of which almost every piece of machinery he constructed gave evidence, he could not fail to succeed. But for some time, of course, he was known only in the neighbourhood of the place where he lived. His connexions, however, gradually became more and more extensive; and at length he began to undertake engineering in all its branches. He distinguished himself greatly in 1752, by the erection of a water-engine for draining a coal-mine at Clifton in Lancashire. The great difficulty in this case was to obtain a supply of water for working the engine; this he brought through a tunnel of six hundred yards in length, cut in the solid rock. It would appear, however, that his genius was not yet quite appreciated as it deserved to be, even by those who employed him. He was in some sort an intruder into his present profession, for which he had not been regularly educated; and it was natural enough that, before his great powers had had an opportunity of showing themselves, and commanding the universal admiration of those best qualified to judge of them, he should have been conceived by many to be rather a merely clever workman in a few particular departments, than one who could be safely entrusted with the entire management and superintendence of a complicated design. In 1755 it was determined to erect a new silk-mill at Congleton, in Cheshire; and another person having been appointed to preside over the execution of the work, and to arrange the more intricate combinations, Brindley was engaged to fabricate the larger wheels and other coarser parts of the apparatus. It soon became manifest, however, in this instance, that the superintendent was unfit for his office; and the proprietors were obliged to apply to Brindley to remedy several blunders into which he had fallen, and give his advice as to how the work should be proceeded in. Still they did not deem it proper to dismiss their incapable projector; but, the pressing difficulty overcome, would have had him by whose ingenuity they had been enabled to get over it to return to his subordinate place, and work under the direc-

tions of the same superior. This Brindley positively refused to do. He told them he was ready, if they would merely let him know what they wished the machine to perform, to apply his best endeavours to make it answer that purpose, and that he had no doubt he should succeed; but he would not submit to be superintended by a person whom he had discovered to be quite ignorant of the business he professed. This at once brought about a proper arrangement of matters. Brindley's services could not be dispensed with; those of the pretender who had been set over him might be so, without much disadvantage. The entire management of the work, therefore, was forthwith confided to the former, who completed it, with his usual ability, in a superior manner. He not only made important improvements, indeed, in many parts of the machine itself, but even in the mode of preparing the separate pieces of which it was to be composed. His ever-active genius was constantly displaying itself by the invention of the most beautiful and economical simplifications. One of these was a method which he contrived for cutting all his tooth and pinion wheels by machinery, instead of having them done by the hand, as they always till then had been. This invention enabled him to finish as much of that sort of work in one day as had formerly been accomplished in fourteen.

But the character of this man's mind was comprehensiveness and grandeur of conception; and he had not yet found any adequate field for the display of his vast ideas and almost inexhaustible powers of execution. Happily, however, this was at last afforded him, by the commencement of a series of undertakings in this country, which hold a very high rank among the achievements of modern enterprise and mechanical skill; and which were destined, within no long period, to change the whole aspect of the internal commerce of the island.

Artificial water-roads, or *canals*, were well known to the ancients. Without transcribing all the learning that has been collected upon the subject, and may be found in any of the common treatises, we may merely state that the Egyptians had early effected a junction by this means

between the Red Sea and the Mediterranean ; that both the Greeks and the Romans attempted to cut a canal across the Isthmus of Corinth ; and that the latter people actually cut one in Britain from the neighbourhood of Peterborough to that of Lincoln, some traces of which are still discernible. Canal navigation is also of considerable antiquity in China. The greatest work of this description in the world is the Imperial Canal of that country, which is two hundred feet broad, and, commencing at Pekin, extends southward, to the distance of about nine hundred miles. It is supposed to have been constructed about eight centuries ago ; but there are a great many smaller works of the same kind in the country, many of which are undoubtedly much older. The Chinese are unacquainted, as were also the ancients, with the contrivance called a lock, by means of which different levels are connected in many of our modern European canals, and which, as probably all our readers know, is merely a small intermediate space, in which the water can be kept at the same elevation as either part of the channel, into which the boat is admitted by the opening of one floodgate, and from which it is let out by the opening of another, after the former has been shut ;—the purpose being thus attained of floating it onwards, without any greater waste of water than the quantity required to alter the level of the enclosed space. When locks are not employed, the canal must be either of uniform level throughout, or it must consist of a succession of completely separated portions of water-way, from one to the other of which the boat is carried on an inclined plane, or by some other mechanical contrivance.

Canals have also been long in use in several of the countries of modern Europe, particularly in the Netherlands and in France. In the former, indeed, they constitute the principal means of communication between one place and another, whether for commercial or other purposes. In France, the canals of Burgundy, of Briare, of Orleans, and of Languedoc, all contribute important facilities to the commerce of the country. The last-mentioned, which unites the Mediterranean to the Atlantic,

is sixty feet broad and one hundred and fifty miles in length. It was finished in 1681; having employed twelve thousand men for fifteen years, and cost twelve hundred thousand pounds sterling.

It is remarkable that, with these examples before her, England was so late in availing herself of the advantages of canal navigation. The subject, however, had not been altogether unthought of. As early as the reign of Charles the Second a scheme was in agitation for cutting a canal (which has since been made) between the Forth and the Clyde in the northern part of the kingdom; but the idea was abandoned, from the difficulty of procuring the requisite funds. A very general impression, too, seems to have been felt, in the earlier part of the last century, as to the desirableness of effecting a canal navigation between the central English counties and either the metropolis or the eastern coast.

The first modern canal actually executed in England was not begun till the year 1755. It was the result of a sudden thought on the part of its undertakers, nothing of the kind having been contemplated by them when they commenced the operations which led to it. They had obtained an act of parliament for rendering navigable the Sankey brook, in Lancashire, which flows into the river Mersey, from the neighbourhood of the now flourishing town of St. Helen's, through a district abounding in valuable beds of coal. Upon surveying the ground, however, with more care, it was considered better to leave the natural course of the stream altogether, and to carry the intended navigation along a new line; in other words, to cut a canal. The work was accordingly commenced; and, the powers of the projectors having been enlarged by a second act of parliament, the canal was eventually extended to the length of about twelve miles. It has turned out both a highly successful speculation for the proprietors, and a valuable public accommodation.

It is probable that the Sankey Canal, although it did not give birth to the first idea of the great work we are now about to describe, had at least the honour of prompting the first decided step towards its execution. Francis, Duke

of Bridgewater, who, while yet much under age, had succeeded, in the year 1748, by the death of his elder brothers, to the family estates, and the title, which had been first borne by his father, had a property at Worsley, about seven miles west from Manchester, extremely rich in coal-mines, which, however, had hitherto been unproductive, owing to the want of any sufficiently economical means of transport. The object of supplying this defect had for some time strongly engaged the attention of the young Duke, as it had indeed done that of his father; who, in the year 1732, had obtained an act of parliament enabling him to cut a canal to Manchester, but had been deterred from commencing the work, both by the immense pecuniary outlay which it would have demanded, and the formidable natural difficulties against which at that time there was probably no engineer in the country able to contend. When the idea, however, was now revived, the extraordinary mechanical genius of Brindley had already acquired for him an extensive reputation, and he was applied to by the Duke to survey the ground through which the proposed canal would have to be carried, and to make his report upon the practicability of the scheme. New as he was to this species of engineering, Brindley, confident in his own powers, at once undertook to make the desired examination, and, having finished it, expressed his conviction that the ground presented no difficulties which might not be surmounted. On receiving this assurance, the Duke at once determined upon commencing the undertaking; and, an act of parliament having been obtained in 1758, the powers of which were considerably extended by succeeding acts, the formation of the canal was begun that year.

From the first the Duke resolved that, without regard to expense, every part of the work should be executed in the most perfect manner. One of the chief difficulties to be surmounted was that of procuring a sufficient supply of water; and, therefore, that there might be as little of it as possible wasted, it was determined that the canal should be of uniform level throughout, and of course without locks. It had consequently to be carried in va-

rious parts of its course both under hills and over wide and deep valleys. The point, indeed, from which it took its commencement was the heart of the coal-mountain at Worsley. Here a large basin was formed, in the first place, from which a tunnel of three quarters of a mile in length had to be cut through the hill. We may just mention, in passing, that the subterraneous course of the water beyond this basin has since been extended in various directions for about thirty miles. After emerging from under ground, the line of the canal was carried forward, as we have stated, by the intrepid engineer, on the same undeviating level ; every obstacle that presented itself being triumphed over by his admirable ingenuity, which the difficulties seemed only to render more fertile in happy inventions. Nor did his comprehensive mind ever neglect even the most subordinate departments of the enterprise. The operations of the workmen were every where facilitated by new machines of his contrivance ; and whatever could contribute to the economy with which the work was carried on was attended to only less anxiously than what was deemed essential to its completeness. Thus, for example, the materials excavated from one place were employed to form the necessary embankments at another, to which they were conveyed in boats, having bottoms which opened, and at once deposited the load in the place where it was wanted. No part of his task, indeed, seemed to meet this great engineer unprepared. He made no blunders, and never had either to undo anything or to wish it undone ; on the contrary, when any new difficulty occurred, it appeared almost as if he had been all along providing for it—as if his other operations had been directed from the first by his anticipation of the one now about to be undertaken.

In order to bring the canal to Manchester it was necessary to carry it across the Irwell. That river is, and was then, navigable for a considerable way above the place at which the canal comes up to it ; and this circumstance interposed an additional difficulty, as, of course, in establishing the one navigation, it was indispensable

that the other should not be destroyed or interfered with. But nothing could dismay the daring genius of Brindley. Thinking it, however; due to his noble employer to give him the most satisfying evidence in his power of the practicability of his design, he requested that another engineer might be called in to give his opinion before its execution should be determined on. This person Brindley carried to the spot where he proposed to rear his aqueduct, and endeavoured to explain to him how he meant to carry on the work. But the other only shook his head, and remarked, that "he had often heard of castles in the air, but never before was shewn where any of them were to be erected." The Duke, nevertheless, retained his confidence in his own engineer, and it was resolved that the work should proceed. The erection of the aqueduct, accordingly, was begun in September, 1760, and on the 17th of July following the first boat passed over it, the whole structure forming a bridge of above two hundred yards in length, supported upon three arches, of which the centre one rose nearly forty feet above the surface of the river; on which might be frequently beheld a vessel passing along, while another, with all its masts and sails standing, was holding its undisturbed way directly under its keel.

In 1762 an act of parliament was, after much opposition, obtained by the Duke, for carrying a branch of his canal to communicate with Liverpool, and so uniting that town, by this method of communication, to Manchester. This portion of the canal, which is more than twenty-nine miles in length, is, like the former, without locks, and is carried by an aqueduct over the Mersey, the arch of which, however, is less lofty than that of the one over the Irwell, as the river is not navigable at the place where it crosses. It passes also over several valleys of considerable width and depth. Before this, the usual price of the carriage of goods between Liverpool and Manchester had been twelve shillings per ton by water, and forty shillings by land; they were now conveyed by the canal, at a charge of six shillings per ton, and with all the regularity of land carriage.

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In contemplating this great work, we ought not to overlook the admirable manner in which the enterprising nobleman, at whose expense it was undertaken, performed his part in carrying it on. It was his determination, as we have already stated, from the first, to spare no expense on its completion. Accordingly, he devoted to it during the time of its progress nearly the whole of his revenues, denying himself, all the while, even the ordinary accommodations of his rank, and living on an income of four hundred a year. He had even great commercial difficulties to contend with in the prosecution of his schemes, being at one time unable to raise 500*l.* on his bond on the Royal Exchange; and it was a chief business of his agent, Mr. Gilbert, to ride up and down the country to raise money on his Grace's promissory notes. It is true that he was afterwards amply repaid for this outlay and temporary sacrifice; but the compensation that eventually accrued to him he never might have lived to enjoy; and at all events he acted as none but extraordinary men do, in thus voluntarily relinquishing the present for the future, and preferring to any dissipation of his wealth on passing and merely personal objects the creation of this magnificent monument of lasting public usefulness.* Nor was it only in the liberality of his

* Francis, Duke of Bridgewater, died in 1803, at the age of 67, when the ducal title became extinct, and the earldom passed to his cousin, General Egerton. The income arising from his canal property alone was understood to be, at the time of his death, between 50,000*l.* and 80,000*l.* per annum—a large revenue, but not amounting, although we add to it the rents of his other estates, to anything like that assigned to this nobleman, by the writer of his life, in the *Biographie Universelle*, who informs us, that the income-tax which he paid every year amounted alone to 110,000*l.* sterling! “La somme qu’il payait, chaque année, pour sa portion dans la taxe du revenu (*income-tax*) s’élevait seule à 110,000 livres st.” The fact is, that in the returns which he made under the act imposing the tax in question the Duke estimated his income at that amount. He left at his death, besides his large property in land, about 600,000*l.* in the funds.

expenditure that the Duke approved himself a patron worthy of Brindley. He supported his engineer throughout the undertaking with unflinching spirit, in the face of no little outcry and ridicule, to which the imagined extravagance or impracticability of many of his plans exposed him—and that even from those who were generally accounted the most scientific judges of such matters. The success with which these plans were carried into execution, is probably, in no slight degree, to be attributed to the perfect confidence with which their author was thus enabled to proceed.

We have entered at the greater length into the history of this undertaking, both because it was the first of a succession of works of the same description, in which the great engineer of whom we are speaking displayed the unrivalled hardihood, originality, and fertility of his genius, and because from it is also to be dated the commencement of that extended canal navigation, which now forms so important a part of our means of internal communication in this country. While the Bridgewater canal was yet in progress, Mr. Brindley was engaged by Lord Gower,* and the other principal landed proprietors of Staffordshire, to survey a line for another canal, which it was proposed should pass through that county, and, by uniting the Trent and the Mersey, open for it a communication, by water, with both the east and west coast. Having reported favourably of the practicability of this design, and an act of parliament having been obtained in 1765 for carrying it into effect, he was appointed to conduct the work. The scheme was one which had been often thought of; but the supposed impossibility of carrying the canal across the tract of elevated country which stretches along the central region of England had hitherto prevented any attempt to execute it. This was, however, precisely such an obstacle as Brindley delighted to cope with; and he at

* Lord Gower married a sister of the Duke of Bridgewater; and his Grace left his canal property in Lancashire to his nephew, the late Duke of Sutherland (formerly Marquis of Stafford).

once overcame it, by carrying a tunnel through Harecastle Hill, of two thousand eight hundred and eighty yards in length, at a depth, in some places, of more than two hundred feet below the surface of the earth. This was only one of five tunnels excavated in different parts of the canal, which extends to the length of ninety-three miles, having seventy-six locks, and passing in its course over many aqueducts. Brindley, however, did not live to execute the whole of this great work, which was finished by his brother-in-law, Mr. Henshall, in 1777, about eleven years after its commencement.

During the time that these operations, so new in this country, were in progress, the curious crowded to witness them from all quarters, and the grandeur of many of Brindley's plans seems to have made a deep impression upon even his unscientific visitors. A letter which appeared in the newspapers, while he was engaged with the Trent and Mersey Canal, gives us a lively picture of the astonishment with which the multitude viewed what he was about. The writer, it will be observed, alludes particularly to the Harecastle tunnel, the chief difficulty in excavating which arose from the nature of the soil it had to be cut through. "Gentlemen come to view our eighth wonder of the world, the subterranean navigation which is cutting by the great Mr. Brindley, who handles rocks as easily as you would plum-pies, and makes the four elements subservient to his will. He is as plain a looking man as one of the boors of the Peak, or one of his own carters; but when he speaks all ears listen, and every mind is filled with wonder at the things he pronounces to be practicable. He has cut a mile through bogs, which he binds up, embanking them with stones, which he gets out of other parts of the navigation, besides about a quarter of a mile into the hill Yelden, on the side of which he has a pump, which is worked by water, and a stove, the fire of which sucks through a pipe the damp^s that would annoy the men who are cutting towards the centre of the hill. The clay he cuts out serves for brick to arch the subterraneous part, which we heartily wish to see finished to Wilden Ferry, when we shall be

able to send coals and pots to London, and to different parts of the globe."

It would occupy too much of our space to detail, however rapidly, the history of the other undertakings of this description to which the remainder of Mr. Brindley's life was devoted. The success with which the Duke of Bridgewater's enterprising plans for the improvement of his property were rewarded speedily prompted numerous other speculations of a similar description; and many canals were formed in different parts of the kingdom, in the execution or planning of almost all of which Brindley's services were employed. He himself had become quite an enthusiast in his new profession, as a little anecdote that has been often told of him may serve to show. Having been called on one occasion to give his evidence touching some professional point before a Committee of the House of Commons, he expressed himself, in the course of his examination, with so much contempt of rivers as means of internal navigation, that an honourable member was tempted to ask him for what purpose he conceived rivers to have been created? when Brindley, after hesitating a moment, replied, "To feed canals." His success as a builder of aqueducts would appear to have inspired him with almost as fervid a zeal in favour of bridges as of canals, if it be true, as has been asserted, that one of his favourite schemes contemplated the joining of Great Britain to Ireland by a bridge of boats extending from Portpatrick to Donaghadee. This report, however, is alleged to be without foundation by the late Earl of Bridgewater, in a curious work which he published some years ago at Paris, relative to his predecessor's celebrated canal.

Brindley's multiplied labours and intense application rapidly wasted his strength, and shortened his life. He died at Turnhurst, in Staffordshire, on the 27th of September, 1772, in the fifty-sixth year of his age, having suffered for some years under a hectic fever, which he had never been able to get rid of. In his

case, as in that of other active spirits, the soul seems to have

“ O'er-inform'd its tenement of clay ; ”

although the actual bodily fatigue to which his many engagements subjected him must doubtless have contributed to wear him out.

No man ever lived more for his pursuit, or less for himself, than Brindley. He had no sources of enjoyment, or even of thought, except in his profession. It is related, that having once, when in London, been prevailed upon to go to the theatre, the unusual excitement so confused and agitated him as actually to unfit him for business for several days, on which account he never could be induced to repeat his visit. His total want of education, and ignorance of literature, left his genius without any other field in which to exercise itself and spend its strength than that which the pursuit of his profession afforded it : its power, even here, would not probably have been impaired, if it could have better sought relaxation in variety ; on the contrary, its spring would most likely have been all the stronger for being occasionally unbent. We have already mentioned that he was all but entirely ignorant of reading and writing. He knew something of figures, but did not avail himself much of their assistance in performing the calculations which were frequently necessary in the prosecution of his mechanical designs. On these occasions his habit was to work the question by a method of his own, chiefly in his head, only setting down the results at particular stages of the operation ; yet his conclusions were generally correct. His vigour of conception, in regard to machinery, was so great, that, however complicated might be the machine he had to execute, he never, except sometimes to satisfy his employers, made any drawing or model of it ; but, having once fixed its different parts in his mind, would construct it without any difficulty, merely from the idea of which he had thus possessed himself. When much perplexed with any problem he had to solve, his practice was to take to

bed, in order to study it ; and he would sometimes remain, we are told, for two or three days thus fixed to his pillow in meditation.

We shall the more clearly appreciate the impulse given to inland navigation in this country by the achievements of Brindley, and the extent of the new accommodation which our commerce has hence obtained within the last seventy or eighty years, if we cast our eye for a moment over the map of Great Britain, and note a few of the principal canals by which the island is now intersected in all directions. First, there is the Trent and Mersey Canal, which we have already mentioned, and which was denominated by Brindley the Grand Trunk Navigation, as, in fact, uniting one side of the kingdom to the other, and therefore especially adapted to serve, as it has since actually done, by way of stem, from which other similar lines might proceed as branches to different points. By this canal, a complete water communication was established, though by a somewhat circuitous sweep, between the great ports of Liverpool on the west coast and Hull on the east. A branch from it, the Staffordshire and Worcestershire Canal, was afterwards carried to the river Severn ; and thus a union was effected between the port of Bristol and the two already mentioned. This branch, being about forty-six miles long, was also executed by Brindley, and was completed in 1772. Similar communications were subsequently formed from other points on the south coast to the central counties. But the most important line of English canals is that which extends from the centre of the kingdom to the metropolis, and, by falling into the Grand Trunk Navigation, forms in fact a continued communication by water all the way from London to Liverpool. Of this line, the principal part is formed by what is called the Grand Junction Canal, which, commencing at Brentford, stretches northwest till it falls into a branch of the Oxford Canal, at Braunston, in Northamptonshire, passing at one place (Blisworth) through a tunnel three thousand and eighty yards in length, eighteen feet high, and sixteen and a half wide. The Regent and Paddington Canals have

since formed communications between the Grand Junction Canal, and the eastern, western, and northern parts of the metropolis. The whole length of the direct waterway thus established between Liverpool and London is about two hundred and sixty-four miles; but, if the different canals which contribute to form the line be all of them measured in their entire length, the aggregate amount of the inland navigation, in this connexion alone, will be found to extend to above one thousand four hundred miles.

The oldest canal in the northern part of the kingdom is that between the Forth and Clyde, which was executed by the celebrated Smeaton, although its plan was revised by Brindley. It commences at Grangemouth, on the Carron, at a short distance from where that river falls into the Forth, and originally terminated at Port Dundas, in the neighbourhood of Glasgow. It was afterwards carried farther west to Dalmuir. The middle portion of this canal passes over an elevated level for about eighteen miles; and from this summit it descends by no fewer than twenty locks to the Forth, and by twenty-one to the Clyde. More recently a branch has been extended from its north-eastern extremity along the south bank of the Forth as far as Edinburgh; so that the whole now forms an uninterrupted line of canal navigation from very near the west to the east coast of Scotland. The famous Caledonian Canal, in the north of Scotland, also unites the two opposite seas, but stretches less directly east and west than the line that has just been described. It was commenced in 1802, under the management of Mr. Telford, who conducted it throughout; and was first opened on the 23d of October 1822. The distance between the German and the Atlantic Oceans, measured in the direction of this canal, is two hundred and fifty miles; but of this nearly two hundred and thirty miles, consisting of friths and lakes, were already navigable. The canal itself, therefore, which has cost about a million of pounds sterling, is only, properly speaking, about twenty miles in length; and, after all, had not steam navigation been fortunately discovered while the work was going on, there

seems every reason to believe that the cut would have been nearly useless.



Thomas Telford.

The entire length of the canal navigation already formed in Great Britain and Ireland is not much under three thousand miles. The whole of this was the creation of about seventy years, during which period, therefore, considerably above forty miles of canal may be said to have been produced every year,—a truly extraordinary evidence of the spirit and resources of the country, which has been able to continue so large an expenditure, for so long a time, on a single object; and which, besides, has in a single year, during that period, spent almost as much money upon war as all those canals together have cost for three quarters of a century. If Brindley had never lived, we should undoubtedly ere now have been in possession of much of this accommodation; for the time was ripe for its introduction, and an increasing commerce, every where seeking vent, could not have failed, ere long, to have struck out for itself, to a certain extent, these new facilities. But, had it not been for the example set by his

adventurous genius, the progress of artificial navigation among us would probably have been timid and slow, compared to what it has been. For a long time, in all likelihood, our only canals would have been a few small ones, cut in the more level parts of the country, like that substituted in 1755 for the Sankey Brook, the benefit of each of which would have been extremely insignificant, and confined to a very narrow neighbourhood. He did, in the very infancy of the art, what has not yet been outdone ; struggling, indeed, with such difficulties, and triumphing over them, as could be scarcely exceeded by any his successors might have to encounter. By the boldness and success with which, in particular, he carried the Grand Trunk Navigation across the elevated ground of the midland counties, he demonstrated that there was hardly any part of the island where a canal might not be formed ; and, accordingly, this very central ridge, which used to be deemed so insurmountable an obstacle to the junction of our opposite coasts, is now intersected by more than twenty canals beside the one which he first drove through the barrier. It is in the conception and accomplishment of such grand and fortunate deviations from ordinary practice that we discern the power, and confess the value, of original genius.

The case of Brindley affords us a wonderful example of what the force of natural talent will sometimes do in attaining an acquaintance with particular departments of science, in the face of almost every conceivable disadvantage—where not only all education is wanting, but even all access to books. Nor is he the only celebrated practical mechanic that might be named, whose inventive faculties have been successfully exercised without any help from literature. The French engineer, SWALM RENKIN, or RANNEQUIN, as he is more commonly called, who, in the reign of Louis XIV., constructed the famous machine of Marli for raising the water of the Seine to the gardens of Versailles, was originally only a common carpenter at Liege, where he was born about the middle of the seventeenth century, and had no means of acquiring knowledge except in the workshop and by his

own reflection. A learned contemporary writer, Professor Weidler, of Wittemberg, describes him by the Greek epithet *αναλφαβητος*—*ignorant even of the alphabet*. Yet the apparatus which he erected at Versailles, and which was of extraordinary complexity, was regarded in that age as the greatest mechanical wonder in the world. It raised water from the Seine to the height of four hundred and seventy-six feet above the level of the river. The Italian engineer, NICHOLAS ZABAGLIA, who was born at Rome in 1674, was also originally a poor working carpenter, and altogether uneducated. In this capacity he was first employed at the Vatican; and yet he was eventually appointed to preside over the building of St. Peter's, where he did not, however, confine himself to the duties of superintendence and direction, but continued to work with his own hands as before. Zabaglia was the author of many mechanical contrivances, distinguished for their simplicity and elegance. He was the contemporary of BARTHOLOMEW FERRACINO, another self-taught mechanician of great genius. Ferracino was bred a sawyer, in which occupation he was employed while very young, and when the severe labour was almost too much for his strength. He at length, however, contrived a saw which moved by the wind, and did his work for him. After this, he invented many other ingenious machines, and acquired a distinguished reputation in various departments of practical mechanics. The great clock in the Place of St. Mark, at Venice, was constructed by him. But his greatest work was the bridge over the Brenta, near his native town of Bassano, which has been much celebrated. Ferracino was quite ignorant of books; and when his friends would sometimes judiciously advise him to give his great natural powers fair play, by applying himself to the regular study of the principles of mechanical science, he used to say, with a foolish laugh, which his ignorance alone could excuse, that nature had been a very good teacher to him, and that he had all the book he wanted in his head. Our own countryman, the celebrated JOHN HARRISON, who, in 1767, obtained the parliamentary reward of twenty thousand pounds for the invention of his admirable time-

piece for ascertaining the longitude at sea, may be quoted as another example of self-taught genius, but not so entirely unaided by books. He was born at Pontefract, in Yorkshire, in 1693, and was bred a carpenter; yet he very early manifested a taste for mathematical science, which is said to have been first awakened by a manuscript copy of some lectures of Saunderson (the blind mathematician) that accidentally fell into his hands; and it should



John Harrison.

seem that he was not so entirely without education as to be unable to peruse and profit by them. Before he was twenty-one, he had made two wooden clocks by himself, and without having received any instructions in the art. We have, in a former chapter, mentioned the circumstance of his having been first induced to think of applying himself to the construction of marine chronometers by living for some time in sight of the sea. It was in 1728 that he first came up to London, in order to prosecute this object; but he had to devote to it the anxious labours of nearly forty years before his inventions were

perfected, or their general merit fully recognized. The art of watchmaking owes several valuable improvements to Harrison; among which may be particularly mentioned the gridiron pendulum, and the expansion balance-wheel—the one serving to equalize the movements of a clock, and the other those of a watch, under all changes of temperature—and both depending upon the unequal stretching under change of temperature of two different metals, which are so employed to form the rod of the pendulum and the circumference of the wheel, that the contraction of the one exactly counterbalances the expansion of the other. Although, however, a most skilful and ingenious artist, Harrison never acquired any acquaintance with literature; and a little work which he published in his old age, in explanation of some of his ideas on the construction of time-pieces, is miserably ill-written. He died in London, in 1776, at the age of eighty-three.

Of these, and all such instances, it may safely be remarked that, far from proving the inutility of scientific acquirements, they only show how far, in one particular line, natural genius can carry its possessors without cultivation; and make us regret their having wanted those helps which, even in that line, would have carried them so much farther.

CHAPTER XX.

Knowledge of Languages. Magliabecchi; Hill; Wild; Aram;
Purver; Pendrell.

IF mechanical invention does not necessarily imply much study of books, and may seem, on that account, a province of intellectual exertion fitted for persons who have not enjoyed the advantages of a regular education, as being one in which natural sagacity and ingenuity, as much as literary attainments, are requisite to ensure advancement, the same thing can hardly be said of another department, in which self-taught genius has frequently made extraordinary progress; we mean the study of languages. This is the sort of knowledge, indeed, which, in common parlance, is more peculiarly called learning. Its acquisition, in the circumstances alluded to, can only be the result of a love for, and familiarity with, books, and of what we may call the literary habit thoroughly formed.

There are three purposes for which languages may be studied, independently of their gratifying that general desire of information which makes both the acquirement and the possession of all knowledge delightful. One use, and an infinitely important one, to be made of the knowledge of languages, is the study of that intellectual mechanism by which they have been formed, and of which they present us, as it were, with the impress or picture. Another department of philosophy to which this knowledge is a key, is that relating to the early history of our race, and the origin of the different nations by whom the earth is peopled—a subject to many parts of which we have no other guide than the evidence of language, but upon which this evidence, skilfully interpreted, may be made to throw the surest of all light. But the motive

which most generally induces the student to seek an acquaintance with foreign or ancient tongues is, of course, that he may be able to read the books written in them, and thus obtain access to worlds of intellectual treasure, from which he would be otherwise entirely, or almost entirely, shut out; for no satisfactory knowledge of any foreign literature is to be acquired through translations. Of many works translations do not exist, or are not accessible, when the original is; and of many there can be no adequate translation. The man whose knowledge of the literature of another age or country is confined to translations, is in the situation of the untravelled reader, who may, indeed, learn something of foreign lands from the descriptions of those who have visited them; but a person familiar with the language of another people has that sort of access to their literature, which he would have to the general knowledge of their country and their manners who was in possession of one of the talismans of eastern fiction, by which he could transport himself thither at a wish.

Perhaps the greatest reader that ever lived was the famous ANTONIO MAGLIABECCHI, of whose latinized name, *Antonius Magliabecchius*, some one formed the anagram,—*Is unus bibliotheca magna*—*Himself a great library*. He was born at Florence, in 1633, and, according to one account, commenced his career as a scholar in a very curious manner; for having, it is affirmed, been apprenticed by his parents, who were extremely poor, to a seller of pot-herbs, he used to take the greatest delight, although he could not read a word, in poring over the leaves of old books in which his master wrapped his commodities; till, having been one day observed at this sort of study by a bookseller who lived in the neighbourhood, that person offered to take him into his service. The proposal was instantly accepted by Magliabecchi, who could conceive no greater happiness than an occupation which would surround him with his beloved books. So keen, it is added, was the interest which he took in his new employment, that in two or three days he knew the place of every volume in the shop, and could find any

one, when asked for, more readily than his master himself. After a short time he had learned to read, and then every moment of his leisure was devoted to this new pleasure. Such is the story which Mr. Spence has told us, on the authority, as he states, of a Florentine gentleman well acquainted with Magliabecchi and his family. The Italian writer, Marmi, however, who, having been librarian to the Grand Duke of Florence, was, for many years, an intimate friend of Magliabecchi, has, in a life which he has written of him, given a different account of his early years. His mother, according to Marmi, had him instructed both in the art of design and in Latin when he was a boy, after which she apprenticed him to goldsmith. Whether his master was a goldsmith or a bookseller, it is agreed on all hands that, during the time of his apprenticeship, Magliabecchi had already begun those extraordinary acquisitions which made him at length the most learned man of his age. The fame of his ardour for study, and extensive knowledge, at length procured him the notice of some of the Florentine literati; and, having been introduced at court, he was appointed by the Grand Duke keeper of one of his libraries. In this situation he remained till his death, in 1714, at the age of eighty-one.

Many wonderful stories are told of the extensive reading and retentive memory of Magliabecchi. It has been said, among other things, that a manuscript of a work of some length, which, at the request of the author, he had read, having been lost, was actually recovered by being taken down from his recitation. This, however, as Mr. Spence observes, is doubtless a very wild exaggeration; it amounts, evidently, if true, to nothing less than a proof that Magliabecchi's memory was such as to retain everything, without exception, to which his attention was ever called. But of what he read really worth recollecting, he undoubtedly recollected a great deal. He was, indeed, a library of reference upon all sorts of subjects for the other literary men of his time, who were wont to apply to him whenever they wanted to know what had been already written upon any matter which they were engaged in

studying or discussing. Two volumes of the 'Letters of the Learned' to Magliabecchi were published at Florence in 1745, and they form but a small part of those that were addressed to him during his long life, from every part of Europe, by persons who wished to avail themselves of the aid of his universal learning. Upon almost any subject, we are told, on which he was consulted, he could not only state what any particular author had said of it, but in many cases could quote the very words employed, naming, at the same time, the volume, the page, and the column in which they were to be found. Authors and printers were generally wont to send him all the works which they published—a sure method, if they contained anything valuable, of getting them, as it were, advertised over the world of letters, since literary men were everywhere in communication with Magliabecchi, and he would not fail, if the new book deserved his recommendation, to mention its merits to such of his correspondents as it was likely to interest. He had a sort of short-hand method of reading, by which he contrived to get over a great many volumes in little time, and which every person will be in some degree able to understand who has been much in the habit of looking over new books. His way, we are told, was to look first to the title-page, then to dip into the preface, dedication or other preliminary matter, and, finally, to go over the divisions or chapters; after which, being so completely in possession as he was of all that former writers had said upon the subject treated of, he had a competent general notion of the contents of the new work. Of course, if this cursory inspection gave him reason to believe that there was in any part of it matter really new and important, he would examine it more particularly before he laid it down. At all events, it is certain that, although thus expeditiously acquired, his knowledge was the very reverse of superficial. The reverence with which he was regarded by the greatest scholars of his time proves this. The dexterity, if we may so call it, which he attained in the art of acquiring such knowledge as can be communicated by books was in great part the result of

the exclusiveness with which he devoted his life to that object. He might be said literally to live in his library ; for in fact he both slept and took his meals in the midst of his books. Three hard eggs and a draught of water formed his common repast ; and a sort of cradle, which he had made for the purpose, served him both for his elbow-chair during the day, and for a bed at night. He never travelled more than a few miles from Florence ; but all the great libraries in the world were nevertheless nearly as well known to him as his own. “ One day,” says Mr. Spence, “ the Grand Duke sent for him, after he was his librarian, to ask him whether he could get for him a book which was particularly scarce. ‘ No, Sir,’ answered Magliabecchi, ‘ it is impossible, for there is but one in the world ; that is in the Grand Seignor’s library at Constantinople, and is the seventh book on the second shelf, on the right hand as you go in.’ ” This is not to be taken as a proof of the extraordinary memory of Magliabecchi ; for, the book in question being a remarkable one, it is not at all wonderful that the circumstance which, in point of fact, principally made it so should have been distinctly remembered by him : but the familiar style in which he alludes to the localities of the Sultan’s library, shews the hold that everything about it had taken of his fancy, and how entirely books were his world.

We are too apt, perhaps, to underrate Magliabecchi as a mere *helluo librorum*, or book glutton. Probably few men have passed their lives with more enjoyment to themselves, and, at the same time, more serviceably in regard to others. His powers of mind, wonderful as they were in certain respects, do not seem to have been such as qualified him for profound and original thinking, or for enlarging the boundaries of human knowledge. He did what he was best fitted to do well, when he devoted himself to the accumulation of a multifarious learning for his own gratification, and, the benefit of all who needed his assistance. In choosing this province for himself, he certainly chose that which no one else could have occupied so successfully.

The Rev. Joseph Spence, whom we have already mentioned more than once in these pages, has written a little volume, which he entitles, 'A Parallel, in the manner of Plutarch, between a most celebrated man of Florence, and one, scarce ever heard of, in England.' The celebrated Florentine here alluded to is Magliabecchi; and our obscure countryman, with whom he is compared, is a person of the name of ROBERT HILL. Hill, as Spence informs us, was born in 1699, at Miswell, near Tring, in Hertfordshire, of parents in humble life, who had scarcely been married a year when his father died. Five years after this event, however, his mother was married a second time to a tailor at Buckingham; but upon removing from that place she left Robert at Miswell, in charge of his grandmother. The old woman herself taught him to read, and afterwards sent him to school for seven or eight weeks to learn writing, which was all the school education he ever received. He then went to reside with an uncle who lived at Tring Grove, by whom he was employed to drive the plough, and do other country work. At last, when he was about fifteen years of age, it was resolved to bind him an apprentice to his father-in-law, the tailor. With him he remained for the usual period of seven years, in which time he learned that business. In the year 1716, he chanced to get hold of an imperfect Latin Accidence and Grammar, and about three-fourths of a Littleton's Dictionary. He had already begun to be a great reader, purchasing candles for himself with what money he could procure, and sitting up at his books a great part of the night, the only time he had any leisure; but these acquisitions gave additional force to a desire he had for some time felt to learn Latin, originally excited, as he declared, by some epitaphs in that language in the church, which his curiosity made him wish very much to be able to read. Next year, however, he was sent back to Tring Grove, in consequence of the small-pox raging in Buckingham; and, in the hurry of departure, he left his Latin books behind him. It was a year and a quarter before he returned to Buckingham, and during that interval he was employed in keeping his

uncle's sheep, an occupation in which he said he was very happy, as, to use his own expression, "he could lie under a hedge and read all day long." The only books he had with him were the 'Practice of Piety,' the 'Whole Duty of Man,' and a French Grammar, which he read so often through, that at last he had them almost all by heart. When he got back to Buckingham, however, he found his old Latin Grammar; and this set him anew on his classical studies. Here he derived considerable assistance from some of his young companions, who were attending the Free Grammar School of the place, and whom he used to bribe to help him over his difficulties, by doing for them in return any little service in his power. He considered himself very well paid for running on a message by being told the English of some Latin word, which he had not been able to find in his dictionary. In this way he enabled himself, before the expiration of his apprenticeship, to read a great part of a Latin Testament, which he had purchased, as well as of a Cæsar, which some one had given him.

On getting over his apprenticeship, he married, and set up in business for himself. Soon after, a gentleman by whom he was employed gave him a Homer and a Greek Testament; upon which, as he could not bear to have a book in his possession which he was unable to read, he resolved to learn Greek. Accordingly he imparted his scheme to a young gentleman to whom he was known, and received from him a grammar of the language, and a promise of his assistance, Hill engaging to teach him to fish in return for his literary instructions.

His family beginning now to increase, he bethought him of adding something to his income by his book-knowledge; and in the year 1724, he opened a school for reading, writing, and arithmetic, which he continued to teach for six or seven years. By his own account, however, he was not at first very well prepared for some of the duties of his new employment. Soon after he had entered upon it, a scholar came to him wishing to receive lessons in arithmetic, who had already advanced as far as decimal fractions. Poor Hill himself had at this time got

no further than what he calls "a little way into division;" and he was at first in no small consternation: however, he hit upon a plan of managing the matter which answered well enough. To consume the time, he set his pupil, by way of preliminary exercise, to copy a series of tables, which had some apparent relation to the subject of his intended studies. They must have been tolerably voluminous, for we are told they occupied the patient writer six weeks, although it may be supposed his master was not very importunate in urging him through the task. Meanwhile, however, Hill made the best use he could of the respite he had obtained for himself by this stratagem; and by sitting up frequently nearly the whole night, after his day's work was over, he contrived, by the time the copying of the tables was finished, to be a small degree in advance of his pupil.

After he had been married for seven or eight years his wife died; but in two years he married again. This second match turned out very unfortunate; his wife, who appears to have been a worthless person, having in a short time run him so much in debt, that he found it necessary to leave the place, and thus to effect his escape at once from her and his creditors. He now led, for several years, a wandering life; continuing, as he travelled through the country, both to work at his business and to pursue his studies. He was seized with a violent desire to learn Hebrew, in consequence of meeting with some quotations in that language in a book which he was perusing; but for a long time he could not find a grammar he could make anything of, although he tried no fewer than eleven; and at last he got so out of humour at his ill success, that he disposed of them all again, and gave up his design. His desire to learn the language, however, soon returned; and, having bought a lot of thirteen Hebrew books for as many shillings, he was lucky enough to find among them a grammar (Stennit's) which he was able to understand; and, having in this way got over the first difficulties of the study, he went on with great ease.

It was twelve years after he parted from his wife be-

fore he returned to Buckingham, which he did at last, on hearing accidentally that she had been two or three years dead. Soon after his return, he married a third time, and once more resumed a domestic and settled life. This was in the year 1747. Till now he had, according to his own account, concealed his literary acquirements; but about this time he attracted the notice of a clergyman in the neighbourhood of Buckingham, who had chanced to put a question to him, which he answered in such a way as to discover his scholarship. His clerical friend, some time after the commencement of their acquaintance, put into his hands Bishop Clayton's 'Essay on Spirit;' and Hill, having read the book, wrote a series of remarks on it, which were published in the year 1753. This was his first attempt at authorship. He afterwards sent to the press several other productions on theological subjects, of which one entitled 'Criticisms on the Book of Job,' in five sheets, was the largest.

When Spence first met Hill, which was at the house of the clergyman just mentioned, he was in great poverty, and struggling hard to obtain a subsistence for himself and his family. Bad times had made employment scarce; and "this," says Spence, "has reduced him so very low, that I have been informed that he has passed many and many whole days in this and the former year, without tasting anything but water and tobacco. He has a wife and four small children, the eldest of them not above eight years old; and what bread they could get he often spared from his own hunger to help towards satisfying theirs." Spence's principal object in publishing his little work was to raise a subscription for the poor scholar who was its subject; and who, notwithstanding some errors by which part of his life was marked, appears to have been upon the whole a person of much worth of character, and well deserving of public sympathy and encouragement. It is believed that the effect of this appeal was to relieve him, for the rest of his days, from the difficulties under which he was at this time suffering. He continued to live at Buckingham for about twenty years after his remarkable acquirements had in this way

been made known to the world, having died there in the year 1777.

Hill was evidently not a person of any uncommon extent of talent or quickness of apprehension ; and it is this peculiarity that chiefly makes his example interesting and instructive. His story teaches us what the mere love and persevering pursuit of knowledge may accomplish, even where there is no extraordinary degree of mental power to make up for the want of a regular education. All his acquirements were made laboriously and slowly. As he himself stated, he had been seven years in learning Latin, and fourteen in learning Greek ; and, although he declared he could teach any person Hebrew in six weeks, his own difficulties, we have just seen, in the acquisition of the elements of that tongue had been far from inconsiderable. Everything yielded, however, to his invincible perseverance, and a zeal which no labour could damp or exhaust. " When I was saying to him," writes Spence, " among other things, that I was afraid his studies must have broken in upon his other business too much, he said that sometimes they had a little ; but that his usual way had been to sit up very deep into the nights, or else to rise by two or three in the morning, on purpose to get time for reading, without prejudicing himself in his trade." Although of a weakly constitution, he had in this way, we are told, accustomed himself to do very well with only two or three hours of sleep in the twenty-four, and he lived to be seventy-eight.

Nearly contemporary with Hill, lived HENRY WILD, another learned tailor, who had also acquired an extraordinary knowledge of languages chiefly by his own unassisted efforts. Wild, who was born in 1684, had been at the grammar school of Norwich for several years when a boy ; but, upon leaving it, was bound apprentice to a tailor in the same city, with whom he served first for seven years under his indenture, and then for seven more as a journeyman. In the course of this protracted estrangement from literature, he almost completely forgot whatever scholarship he had at one time possessed. Having, however, been attacked by a lingering fever and ague,

and obliged to discontinue working at his trade, he took to reading by way of amusing his leisure ; and it was in the course of his perusal of a work of controversial divinity, that, like Hill, he met with some Hebrew quotations, which are said to have first inspired him with the resolution of endeavouring to recover his school-learning. Accordingly, by labouring hard for some time, he at last succeeded in enabling himself again to read Latin with tolerable facility ; upon this he immediately proceeded to the study of Hebrew, and soon made considerable progress in that tongue also, by the aid of a dictionary, in which the words were rendered in Latin. While he was thus engaged, his health gradually improved, and he was enabled to return to his business ; but he did not, for all that, neglect his studies. After working all day, his general practice was to sit up reading for a great part of the night, deeming himself far more than compensated for his labours and privations, by obtaining, even at this sacrifice, a few hours every week for the pursuits he loved ; and in this manner, within seven years, he had actually made himself master of the Latin, Greek, Hebrew, Chaldee, Syriac, Arabic, and Persian languages. Yet his extraordinary attainments seem not to have been generally known till a fortunate accident introduced him to the notice of Dean Prideaux, a distinguished proficient in Oriental learning. The Dean, who also resided in Norwich, was one day shewn some Arabic manuscripts in a bookseller's shop, which, upon inspecting them, he wished to purchase ; but the bookseller would not dispose of them for the price he offered. Some days afterwards, regretting that he had not secured the manuscripts, he returned to the bookseller, intending to give him what he asked, when, upon making inquiry after them, he learned to his consternation that they had been sold to a tailor ! Never doubting that they were destined for the scissors, if not already in shreds, he requested that the tailor, who was no other than Wild, might be instantly sent for, that they might yet, if it were possible, be saved. Upon Wild making his appearance, the Dean had the gratification of learning, in answer to his first question, that

the parchments were still uninjured ; but he was very much surprised when, upon expressing his wish to purchase them, Wild refused to part with them. "What can you mean to make of them ?" asked the Dean. Wild told him he intended to read them ; and the Dean found, upon examining him, that this was no vain boast : the manuscripts were produced, and Wild read and translated a part of them in his presence. Dr. Prideaux soon after exerted himself to raise a small subscription for this poor and meritorious scholar, by which means he was sent to Oxford, not to be entered at the University, but that he might have access to the libraries, and find a more appropriate occupation for his talents, in teaching those Oriental tongues with which he had in so wonderful a manner contrived to make himself acquainted. He came to Oxford about the year 1718, and resided in that city, where he went by the name of the Arabian Tailor, for two or three years, having been employed partly in teaching, and partly in making transcripts and translations from Oriental manuscripts in the Bodleian library. Nothing more is known of him, except that in 1720 he removed to London, where he was patronised by the celebrated Dr. Mead. The period of his death has not been ascertained ; but in 1734 there appeared a translation by him of an Arabic production, entitled 'Mahomet's Journey to Heaven,' which is supposed, however, to have been a posthumous publication. There is a letter from Dr. Turner respecting Wild among the 'Letters by Eminent Persons,' published some years ago by Dr. Bliss, from which it would appear, that, in pursuing his solitary studies, he had to struggle with severe penury, as well as with other disadvantages. The letter is dated in 1714, while Wild was still at Norwich ; and the writer, after mentioning his extensive acquisitions, adds, "But he is very poor, and his landlord lately seized a Polyglot Bible (which he had made shift to purchase) for rent."

We may here mention the wretched EUGENE ARAM, who was tried and convicted, in 1759, for a murder committed fourteen years before. The strange circumstances which, after so long a concealment, led to the discovery

of this crime, form one of the most singular chapters in the history of human guilt. This man, whom bad passions led to the commission of so sad an atrocity, and, in consequence, to so miserable an end, strikingly exemplified, in the previous part of his life, what resolution and perseverance may accomplish in the work of self-education. Aram, who was born in Yorkshire in the year 1704, only learned to read a little English in the school of his native village, and never afterwards had the benefit of any further instruction; yet, by his own exertions, he first qualified himself to teach all the more common branches of education, including arithmetic and mathematics, and then proceeded, with an industry that has scarcely been surpassed, to make his way to the highest departments of learning. In a letter written to a clerical friend from York Castle, after his conviction, in which he gives an account of his life, he says, referring to the period when he was first engaged in thus at the same time teaching others and himself, "Perceiving the deficiency in my education, and sensible of my want of the learned languages, and prompted by an irresistible covetousness of knowledge, I commenced a series of studies in that way, and undertook the tediousness, the intricacies, and the labours of grammar. I selected Lily from the rest, all which I got and repeated by heart. The task of repeating it all every day was impossible while I attended the school; so I divided it into portions, by which method it was pronounced thrice every week; and this I performed for years. Next I became acquainted with Camden's Greek Grammar, which I also repeated in the same manner, *memoriter*. Thus instructed, I entered upon the Latin classics, whose allurements repaid my assiduities and my labours. I remember to have at first hung over five lines for a whole day; and never, in all the painful course of my reading, left any one passage but I did, or thought I did, perfectly comprehend it. After I had accurately perused every one of the Latin classics, historians, and poets, I went through the Greek Testament, first parsing every word as I proceeded: next I ventured upon Hesiod, Homer, Theocritus, Herodotus,

Thucydides, and all the Greek tragedians. A tedious labour was this ; but my former acquaintance with history lessened it extremely, because it threw a light upon many passages which, without that assistance, must have appeared obscure." There was scarcely any part of literature, indeed, with which Aram was not profoundly conversant. History, antiquities, heraldry, botany, had all been elaborately and extensively studied by him : but his favourite pursuit was the investigation and comparison of languages, with a view to the determination of their origin and connexion. For this purpose, in addition to the Greek, Latin, and French, he had studied with great attention several of the Oriental tongues, and all the remaining dialects of the Celtic. He had meditated, indeed, the compilation of a dictionary of the Celtic, Hebrew, Greek, Latin, and English, in which different languages he is said to have left behind him a list of about three thousand words, which he considered them to possess in common. Some of his observations upon this subject have been printed, and are creditable both to his ingenuity and good sense. The address, we may add, which he delivered on his trial in his own defence, is an extraordinary specimen of the curious learning with which his mind seems to have been stored. But he is a mournful example of high mental powers brought low by ill-regulated passions, and of the vanity and worthlessness even of talents and knowledge, when separated from moral principle.*

There is an English translation of the Scriptures, in two volumes folio, which was published at London in 1765, and which, although not distinguished by much elegance, is held in considerable esteem for its general accuracy and closeness to the original. This was the work of a person of the name of ANTHONY PURVER, who, at the time when it appeared, was a schoolmaster at Andover, but had been almost entirely self-educated. Having been born (about the year 1702) in low life, he had been ori-

* For the trial of Eugene Aram, see Howell's 'State Trials.'

ginally apprenticed to a shoemaker, by whom, however, he was employed as a shepherd, an occupation which afforded him considerable leisure for reading and study. In the course of time he acquired, with scarcely any assistance, a very considerable knowledge of Latin, Greek, and Hebrew. It was the accidental perusal of a book, in which some errors were pointed out in the common translation of the Bible, that first awakened in him a desire to make himself acquainted with the two sacred tongues. Purver, who died in 1777, was a Quaker; and his version of the Scriptures, which was the labour of thirty years of his life, was published at the expense of the eminent Dr. Fothergill,* who was himself also a member of that religious body.

A few years ago there appeared in the newspapers an account of a scholar in humble life, who died some time before in London, and whose attainments seem to have been as extensive, and as entirely the result of his own exertions in quest of knowledge, as those of any one of the individuals we have yet mentioned. JOSEPH PENDRELL had received at school nothing more than the ordinary education in English reading and writing, and at an early age was apprenticed by his father to a shoemaker, which business he followed until his death. He had, when young, a great taste for books; but was first led to the more learned studies, in which he eventually made so much progress, by the following accident:—Stopping at a book-stall one day, he laid hold of a book of arithmetic marked fourpence; he purchased it, and availed himself of his leisure hours at home in making himself master of the subject. At the end of the volume he found a short introduction to the mathematics. This stimulated him to make further purchases of scientific works; and in this way he gradually proceeded from the

* Dr. Fothergill gave Purver 1000*l.* for the copy of his translation (an attempt had before been made to publish it in numbers), and also carried it, at his own expense, through the press. Purver afterwards revised the work for a second edition, which, however, has never appeared. See *Chalmers's Biographical Dictionary*.

elements to the highest departments of mathematical learning. When a journeyman, he made every possible saving in order to purchase books. He found there were many valuable writers on his favourite subject in French: this determined him to study that language, for which purpose he procured a grammar, a book of exercises, and a dictionary, and he persevered until he was able to read the French writers with ease. In the same manner he proceeded to acquire the Latin and Greek languages, of the latter of which he made himself master so far as to have little difficulty in reading the Septuagint, or any other common prose work. He had formed a large collection of classical books, many of which he purchased at the auction-rooms in King-street, Covent-garden, formerly belonging to Paterson, the celebrated book-auctioneer,* in whose time they formed a favourite resort of literary men. Pendrell did not, however, avail himself of any opportunity of becoming known to the literary characters he was accustomed to meet here. On the contrary, he always shunned notice, and made it a practice invariably to conceal his name when a lot was knocked down to him. He had often met in these rooms the learned Bishop Lowth, who frequently fell into conversation with him, as they sometimes happened to meet before the sale began. The Bishop was much interested with his conversation, and one day asked Paterson who he was, on which Paterson took the first opportunity to inquire his name, acquainting him, at the same time, who the person was that felt interested in his favour. The poor shoemaker, however, from extreme diffidence, declined telling Paterson his name, although the introduction to the Bishop, of which an opportunity was thus given him, might probably have drawn him from obscurity, and led to some improvement of his humble circumstances. Pendrell's knowledge of mathematical science was profound and extensive, embracing fortification, navigation, astronomy, and all the different departments of natural philosophy. He was also familiar with our

* See vol. i. p. 179.

poetical literature; and had a thorough acquaintance with most English writers in the department of the *belles lettres*. He resided for several years before his death in Gray's-buildings, Duke-street, Manchester-square, and died in the seventy-fifth year of his age. He was descended, it is supposed, from the Pendrell who concealed Charles II. after the battle of Worcester.

CHAPTER XXI.

Force of Application. Dr. Alexander Murray.

WITH the exception of Magliabecchi, the names we have as yet mentioned under our present head have been those of persons whose acquirements, although most honourable to themselves, and well entitled to our admiration when the circumstances in which they were made are considered, have yet hardly been such as to secure for their possessors any permanent place in the annals of the learned. They are remembered not so much on account of what they accomplished as on account of the disadvantages under which it was accomplished. But he whom we are now to introduce, while the narrative of his progress from obscurity to distinction presents to us as praiseworthy a struggle with adverse circumstances as is anywhere else recorded, had taken his rank, even before his premature death, among the scholars of his time; and, although suddenly arrested when in the very speed of his career, has bequeathed something of himself in his works to posterity. We speak of the late DR. ALEXANDER MURRAY, the celebrated Orientalist; nor are there many more interesting histories than his in the whole range of literary biography. Happily the earlier portion of it, with which we have principally to do, has been sketched by his own pen* with characteristic *naïveté*; and we are thus in possession both of a very full and of a

* In a letter to the Reverend Mr. Maitland, minister of Minnigaff, written in 1812,—evidently a hasty composition, as it bears to be, and intended only for the eye of a friend, but more beautiful and touching in its unlaboured, and sometimes even incorrect, simplicity of phrase and manner than any less natural eloquence could have made it.

perfectly trustworthy detail of every thing we can desire to know respecting him. This piece of autobiography, which is prefixed to Dr. Murray's posthumous work, 'The History of European Languages,' is, we believe, comparatively but little known to ordinary readers; and both for this reason, and from its value as an illustration of our subject, we shall allot as much space as can be afforded to an abstract of it. There are one or two other sources, from which a few additional particulars with regard to Dr. Murray may be gathered, and to which we shall occasionally refer.

He was born in the parish of Minnigaff, in the shire of Kirkcudbright, on the 22nd of October, 1775. His father was at this time nearly seventy years of age, and had been a shepherd all his life, as his own father, and probably his ancestors for many generations, had also been. Alexander's mother was also the daughter of a shepherd, and was the old man's second wife; several sons, whom he had by a former marriage, being all brought up to the same primitive occupation. This modern patriarch died in the year 1797, at the age of ninety-one; and he appears to have been a man of considerable natural sagacity, and possessed at least of the simple scholarship of which the Scottish peasant is rarely destitute.

It was from his father that Alexander received his first lessons in reading. This was in his sixth year; and he gives an amusing account of the process. The old man, he tells us, bought him a Catechism (which in Scotland is generally printed with a copy of the alphabet, in a large type, prefixed); but "as it was too good a book," he proceeds, "for me to handle at all times, it was generally locked up, and he, throughout the winter, drew the figures of the letters to me, in his *written* hand, on the board of an old *wool-card*, with the black end of an extinguished heather stem or root, snatched from the fire. I soon learned all the alphabet in this form, and became *writer* as well as *reader*. I wrought with the *board* and *brand* continually. Then the Catechism was presented, and in a month or two I could read the easier parts of it.

I daily amused myself with copying, as above, the printed letters. In May, 1782, he gave me a small Psalm-book, for which I totally abandoned the Catechism, which I did not like, and which I tore into two pieces, and concealed in a hole of a dyke. I soon got many psalms by memory, and longed for a new book. Here difficulties rose. The Bible, used every night in the family, I was not permitted to open or touch. The rest of the books were put up in chests. I at length got a New Testament, and read the historical parts with great curiosity and ardour. But I longed to read the Bible, which seemed to me a much more pleasant book; and I actually went to where I knew an old loose-leaved Bible lay, and carried it away in piece-meal. I perfectly remember the strange pleasure I felt in reading the histories of Abraham and David. I liked mournful narratives; and greatly admired Jeremiah, Ezekiel, and the Lamentations. I pored on these pieces of the Bible in secret for many months, but I durst not shew them openly; and, as I read constantly and remembered well, I soon astonished all our honest neighbours with the large passages of Scripture I repeated before them. I have forgot too much of my biblical knowledge, but I can still rehearse all the names of the Patriarchs from Adam to Christ, and various other narratives seldom committed to memory."

His father's whole property consisted only of two or three scores of sheep, and four muirland cows. "He had no debts," says his son, "and no money." As all his other sons were shepherds, it was with him a matter of course that Alexander should be brought up to the same employment; and accordingly, as soon as he had strength for any thing, that is, when he was about seven or eight years of age, he was sent to the hills with the sheep. However, from the first he gave no promise of making a good shepherd, and he was often blamed by his father as lazy and useless. The truth is he was not stout, and was likewise short-sighted,* which his father

* This defect, according to the author of the 'Literary History of Galloway,' who has given a sketch of Dr. Mur-

did not know. Besides, "I was sedentary," says he, "indolent, and given to books, and writing on boards with coals." But his father was too poor to send him to school, his attendance upon which, indeed, would have been scarcely practicable, unless he could have been boarded in the village, from which their cottage, situated in a wild and sequestered glen, was five or six miles distant. About this time, however (in May, 1784), a brother of his mother's, who had made a little money, came to pay them a visit; and hearing such accounts of the genius of his nephew, whose fame was now the discourse of the whole glen, he offered to be at the expense of boarding him for a short time in New Galloway, and keeping him at school there. Our home-taught and mostly self-taught scholar, as he tells us himself, made at first a somewhat awkward figure on this new scene. "My pronunciation of words," says he, "was laughed at, and my whole speech was a subject of fun." "But," he adds, "I soon gained impudence; and before the vacation in August I often stood *dux* of the Bible class. I was in the mean time taught to write copies, and use paper and ink. But I both wrote and printed, that is, imitated printed letters, when out of school."

His attendance at school, however, had scarcely lasted for three months, when the poor boy fell into bad health, and he was obliged to return home. For nearly five years after this he was left again to be his own instructor, with no assistance whatever from any one. He soon recovered his health, but during the long period we have mentioned, he looked in vain for the means of again pursuing his studies under the advantages he had for so short a time enjoyed. As soon as he became sufficiently well he was put to his old employment of assisting the rest of the family as a shepherd boy. "I was still," he says, however, "attached to reading, printing of words, and getting by heart ballads, of which I procured several.

ray's life, made his father often think that his son wilfully deceived him by the incorrect account he gave of the sheep, when sent to observe in what directions they were straying.

. . . . About this time, and for years after, I spent every sixpence that friends or strangers gave me on ballads and penny histories. I carried bundles of these in my pockets, and read them when sent to look for cattle on the banks of Loch Greanoch, and on the wild hills in its neighbourhood." And thus passed away about three years of his life. All this time the Bible and these ballads seem to have formed almost his only reading; yet even with this scanty library he contrived to acquire among the simple inhabitants of the glen a reputation for unrivalled erudition. "My fame," he tells us, "for reading and *a memory* was loud, and several said that I was 'a living miracle.' I puzzled the honest elders of the church with recitals of Scripture, and discourses about Jerusalem, &c. &c." Towards the close of the year 1787, he borrowed from a friend L'Estrange's translation of Josephus, and Salmon's Geographical Grammar. This last work, in particular, as we shall see immediately, had no little share in determining the direction and character of the studies of his future life. Referring, however, merely to the new information of which it put him immediately in possession, he says, "I got immense benefit from Salmon's book. It gave me an idea of geography and universal history, and I actually recollect at this day almost every thing it contains." A Grammar of Geography was also one of the first books that Ferguson studied; although the minds of the two students, differing as they did in original character, were attracted by different parts of their common manual; the one pondering its description of the artificial sphere, the other musing over its accounts of foreign lands, and of the history and languages of the nations inhabiting them. Murray, however, learned also to copy the maps which he found in the book; and, indeed, carried his study of practical geography so far as to make similar delineations of his native glen and its neighbourhood.

He was now twelve years of age; and, as there seemed to be no likelihood that he would ever be able to gain his bread as a shepherd, his parents were probably anxious that he should attempt something in another way to help

to maintain himself. Accordingly, in the latter part of the year 1787, he engaged as teacher in the families of two of the neighbouring farmers ; for his services in which capacity, throughout the winter, he was remunerated with the sum of sixteen shillings ! He had probably, however, his board free in addition to his salary, of which he immediately laid out a part in the purchase of books. One of these was Cocker's Arithmetic, "the plainest," says he, "of all books, from which, in two or three months, I learned the four principal rules of arithmetic, and even advanced to the Rule of Three, with no additional assistance except the use of an old copy-book of examples made by some boy at school, and a few verbal directions from my brother Robert, the only one of all my father's sons by his first marriage that remained with us." He borrowed, about the same time, some old magazines from a country acquaintance. "My memory now," says he, "contained a very large mass of historical facts and ballad poetry, which I repeated with pleasure to myself and the astonished approbation of the peasants around me."

At last, his father having been employed to *herd* on another farm, which brought them nearer the village, Alexander was once more permitted to go to school at Minnigaff for three days in the week. "I made the most," says he, "of these days ; I came about an hour before the school met ; I pored on my arithmetic, in which I am still a proficient ; and I regularly opened and read all the English books, such as the 'Spectator,' 'World,' &c. &c., brought by the children to school. I seldom joined in any play at the usual hours, but read constantly." "It occurred to me," he adds, "that I might get qualified for a merchant's clerk. I, therefore, cast a sharp look towards the method of book-keeping, and got some idea of its forms by reading 'Hutton' in the school, and by glancing at the books of other scholars." This second period of his attendance at school, however, did not last even so long as the former. It terminated at the autumn vacation, that is to say, in about six weeks ; and the winter was again devoted to teaching the children of a few of the neighbouring farmers.

In 1790, he again attended school during the summer for about three months and a half. It seems to have been about this time that his taste for learning foreign languages first began to develope itself, having been excited, as he tells us, by his study of Salmon's Geography. "I had," he writes, "in 1787 and 1788 often admired and mused on the specimens of the Lord's Prayer, in every language, found in Salmon's Grammar. I had read in the magazines and Spectator, that Homer, Virgil, Milton, Shakspeare, and Newton, were the greatest of mankind. I had been early informed that Hebrew was the first language, by some *elders*, and good, religious people. In 1789, at Drigmore, an old woman who lived near shewed me her Psalm-book, which was printed with a large type, had notes on each page, and, likewise, what I discovered to be the Hebrew alphabet, marked letter after letter, in the 119th Psalm. I took a copy of these letters, by printing them off in my old way, and kept them." Meantime, as he still entertained the notion of going out as a clerk to the West Indies, he took advantage of the few weeks he was to be at school, to begin the study of the French language. Not satisfied, however, with learning merely the tasks set him by his master, he used to remain in the school, during the middle of the day, while his companions were at play, and compare together the different grammars used in the class. But we must allow him to tell in his own way the manner in which his French studies introduced him by accident to the Latin tongue also:—

"About the 15th of June, Kerr [one of his class-fellows] told me that he had once learned Latin for a fortnight, but had not liked it, and still had the Rudiments beside him. I said, 'Do lend me them; I wish to see what the nouns and verbs are like, and whether they resemble our French.' He gave me the book. I examined it for four or five days, and found that the nouns had changes on the last syllable, and looked very singular. I used to repeat a lesson from the French Rudiments every forenoon in school. On the morning of the midsummer fair of Newton Stewart I set out for school, and

accidentally put into my pocket the Latin Grammar instead of the French Rudiments. On an ordinary day, Mr. Cramond would have chid me for this; but on that festive morning he was *mellow*, and in excellent spirits—a state not good for a teacher, but always desired in him by me, for he was then very communicative. With great glee he replied, when I told him my mistake and showed him the Rudiments, ‘Gad, Sandy, I shall try thee with Latin;’ and, accordingly, read over to me no less than two of the declensions. It was his custom with me to permit me to get as long lessons as I pleased, and never to fetter me by joining me to a class. There was at that time in the school a class of four boys, advanced as far as the pronouns in Latin grammar. They ridiculed my separated condition. But before the vacation in August I had reached the end of the Rudiments, knew a good deal more than they, by reading at home the notes on the foot of each page, and was so greatly improved in French, that I could read almost any French book at opening of it. I compared French and Latin, and riveted the words of both in my memory by this practice. When proceeding with the Latin verbs, I often sat in the school all mid-day, and pored on the first page of Robert Cooper’s [another of his schoolfellows] Greek grammar—the only one I had ever seen. He was then reading Livy, and learning Greek. By help of his book I mastered the letters; but I saw the sense of the Latin rules in a very indistinct manner. Some boy lent me an old Corderius, and a friend made me a present of Eutropius. I got a common vocabulary from my companion Kerr. I read to my teacher a number of colloquies, and before the end of July was permitted to take lessons in Eutropius. There was a copy of Eutropius in the school that had a literal translation. I studied this last with great attention, and compared the English and Latin. When my lesson was prepared, I always made an excursion into the rest of every book; and my books were not, like those of other schoolboys, opened only in one place, and where the lesson lay.”

All this was the work of about two months and a half

before the vacation and a fortnight after it. During the winter, he was as usual employed in teaching; but he continued to pursue his own studies in private. Having stated that he had bought an old copy of Ainsworth's Dictionary for eighteen pence, and been lucky enough to find a few other Latin books in the possession of some of his friends, he proceeds:—"I employed every spare moment in pondering upon these books. I literally read the Dictionary throughout. My method was to revolve the leaves of the letter A, to notice all the principal words and their Greek synonymes, not omitting a glance at the Hebrew; to do the same by B, and so on through the book. I then returned from x and z to A; and in these winter months I amassed a large stock of Latin and Greek vocables. From this exercise I took to Eutropius, Ovid, and Cæsar, or at times to Ruddiman's Grammar. The inverted order often perplexed me; and I frequently mistook, but also frequently discerned, the sense. The wild fictions of Ovid have had charms for me ever since. I was not a judge of simple and elegant composition; but when any passage contained wild, sublime, pathetic, or singular expressions, I both felt and tenaciously remembered them. Here I got another book which, from that time, has influenced and inflamed my imagination. This was *Paradise Lost*—of which I had heard, and which I was eager to see. I cannot describe to you the ardour, or various feelings, with which I read, studied, and admired this *first-rate* work. I found it as difficult to understand as Latin, and soon saw that it required to be *parsed*, like that language. I account my first acquaintance with *Paradise Lost* an era in my reading."

The following summer, that of the year 1791, appears to have been spent by this indefatigable student still more laboriously than any of the preceding; and the advancement he made is a surprising evidence of what diligence may accomplish. He again attended school for about three months, where he found a class reading Ovid and Cæsar, and afterwards Virgil. "I laughed," says he, "at the difficulty with which they prepared their lessons;

and often obliged them by reading them over, to assist the work of preparation." In addition to the tasks of the school, he read with avidity by himself whatever books in English, Latin, or Greek, he could anywhere borrow. Besides remaining in the school, according to his old custom, at the hours of play, when his amusement was to read the books belonging to the other scholars, he employed his time at home in almost incessant study. "My practice was," he says, "to lay down a new and difficult book after it had wearied me; to take up another—then a third—and to resume this rotation frequently and laboriously. I always strove to seize the sense; but, when I supposed that I had succeeded, I did not weary myself with analyzing every sentence." Having introduced himself to Mr. Maitland, the clergyman of the parish, by writing letters to him in Latin and Greek, he got from that gentleman a number of books, and these, which included Homer, Longinus, the *Œdipus Tyrannus* of Sophocles, a volume of Cicero's *Orations*, &c., he read and studied with great diligence. Nor were his studies confined to the classic tongues. Having purchased a copy of Robertson's *Hebrew Grammar*, he got through it, with all the intricacies of the doctrine of the points, of which the author is an uncompromising champion, in a month. He was soon after fortunate enough to procure a Dictionary of this language, from an old man living in the neighbourhood, whose son had been educated for the church;* and, as the volume happened to contain the whole of the Book of Ruth in the original, he considered it an invaluable acquisition. But a still greater prize than this was a copy of the entire Bible in Hebrew, which was lent to him for a few months by a woman, with whom it had been left by her brother, a clergyman in Ireland.

* This was the father of Robert Heron, a laborious literary character, who died in London about five and thirty years ago, and of whom an account may be found in Mr. D'Israeli's '*Calamities of Authors*.' There was a relationship, as we are informed by the author of '*The Literary History of Galloway*,' between Heron's family and that of Murray.

“I made good use,” says he, “of this loan: I read it throughout, and many passages and books of it a number of times.” This summer must, indeed, to use his own words, have been “devoted to hard and continued reading.” He had, in fact, it would appear, actually made himself familiar, and that chiefly by his own unassisted exertions, with the French, Latin, Greek, and Hebrew languages, and perused several of the principal authors in all of them, within about a year and a half from the time when they were all entirely unknown to him; for it was at the end of May, 1790, that he commenced, as we have seen, the study of French; and all this work had been done by the end of November in the year following. There is not, perhaps, on record a more extraordinary instance of youthful ardour and perseverance. It may serve to show what is possible to be accomplished.

He was again engaged in teaching during the winter, and received, as he states, for his labours about thirty-five or forty shillings. “I devoted,” however, he says, “as usual, every spare hour to study. French, Latin, Greek, and Hebrew, occupied all my leisure time.” In the summer of 1792, he returned to school for the last time; and remained for about three months and a half. The different periods of his school attendance, added together, make about thirteen months, scattered over the space of nearly eight years. From November, 1792, till the March following, he was once more employed in teaching the children of one of the farmers, at a salary of thirty shillings. This winter a friend lent him a copy of Bailey’s Dictionary, from which he learned, he informs us, a vast variety of useful matters. Among other things, it put him in possession of the Anglo-Saxon alphabet and Pater Noster, as well as of a great many words in the same dialect. This was his introduction to the study of the northern languages. There chanced, also, to fall into his hands about the same time a small religious treatise, in Welsh, a language of which he had neither dictionary nor grammar. “I mused, however,” says he, “a good deal on the quotations of Scripture that abounded in it,

and got acquainted with many Welsh words and sentences. If I had a copy of the Bible in any language of which I knew the alphabet, I could make considerable progress in learning it, without grammar or dictionary. This is done by minute observation and comparison of words, terminations, and phrases. It is the method dictated by necessity, in the absence of all assistance." About this time, too, he made himself acquainted with the Abyssinian alphabet, from an inaccurate copy of it which he found in an odd volume of the Universal History. The Arabic letters he had learned before, from Robertson's Hebrew Grammar.

"In the autumn of 1792," says he, "I had, in the hour of ignorance and ambition, believed myself capable of writing an epic poem." So violent, indeed, were his poetical affections at this period, that, having obtained the loan of a volume of Ossian for four days, he had actually transcribed, for his own use, the whole of Fingal. During the ensuing winter he wrote several thousand lines of his poem, which was in blank verse, and its subject the exploits of Prince Arthur. "The poem of 'Arthur,'" says he, "was, so far as I remember, a very noisy, bombastic, wild, and incorrect performance. It was not without obligations to Ossian, Milton, and Homer. But I had completed the seventh book before I discerned that my predecessors were far superior to me in everything. The beauties of the first book of Paradise Lost overwhelmed me, and I began to flag in the *executive department*. My companions, young and ignorant like myself, applauded my verses, but I perceived they were mistaken; for my rule of judgment proceeded from comparison in another school of criticism." The unfinished epic accordingly was thrown into the fire. But poor Murray, in truth, now in his nineteenth year, was looking around him, in all directions, for the means of obtaining an object on which he had set his heart; and he had probably at one time indulged the dream of reaching it through the publication of this poem. His most intimate school companion had, the year before, gone to the university, for which Murray no

doubt felt that he himself was infinitely better qualified, if his utter want of resources had not, at least for the present, opposed an insurmountable barrier to his ambition. But it was not unnatural for him to hope that the successful exertion of his talents in the way of authorship might perchance enable him to gratify his wishes. So, after destroying his epic, he bethought him of what he should substitute in its place. He had happened to purchase a volume of the manuscript lectures of a German professor on Roman literature. They were written in Latin, and he determined to translate them, and offer them to the world in their English dress. Accordingly, having finished his task, he took the work to Dumfries, in the early part of the year 1794; but neither of the two booksellers of the place would publish it. He had brought with him also a quantity of verse, chiefly in the Scottish dialect; and, the other speculation having failed, he resolved to publish these poems by subscription. Fortunately he was saved from this folly by the judicious counsel of one best of all entitled to advise him here. "During the visit to Dumfries," says he, "I was introduced to Robert Burns, who treated me with great kindness, and told me that, if I could get out to college without publishing my poems, it would be much better, as my taste was young and not formed, and I would be ashamed of my productions when I could write and judge better. I understood this, and resolved to make publication my last resource."

At this place, the narrative, as written by Murray himself, terminates; the part of his history that immediately followed being merely alluded to, as well known to the person to whom the letter is addressed. Unknown as our poor scholar was to the wealthy and powerful, he had a friend in the same sphere of life in which he himself moved, who became the means of at last procuring for him the opportunity, which he so greatly desired, of prosecuting his studies. This was an itinerant tea-merchant, of the name of M'Harg, who knew Murray well, and had formed so high an idea of his genius and learning, that he was in the habit of sounding his fame wher-

ever he went. Among others to whom he spoke of him, was Mr. James Kinneir, of Edinburgh, then a journeyman printer in the king's printing-office. Mr. Kinneir, with a zeal in behalf of unfriended merit which does him infinite honour, immediately suggested that Murray should transmit an account of himself, and some evidences of his attainments, to Edinburgh, which he undertook to lay before some of the literary characters of that city. This plan was adopted; and the result was, that the young man, having come up to town, was examined by the Principal, and several professors of the university, and so surprised them by the extent and accuracy of his acquaintance with French, Latin, Greek, and Hebrew, that measures were immediately taken for having the classes thrown open to him, and his maintenance secured while attending them. These arrangements, it would be unjust not to mention, were chiefly effected through the exertions of Principal Baird, who procured for him an exhibition or bursary, as it is called; and whose ardent and most efficient patronage of one thus recommended to him only by his deserts and his need of patronage, entitles him to the lasting gratitude of the commonwealth of learning. Murray was, indeed, very soon able to support himself by the employment which he obtained as a teacher, and by his literary labours. All his difficulties might be said to be over as soon as he had found his way to the university, and his talents had thus been transferred to a theatre where they were sure to acquire him distinction.

For the next ten or twelve years of his life he resided principally in Edinburgh. During that time, beside passing through the course of education necessary to qualify him for the ministry of the Scottish church, he continued to devote himself with all his old enthusiasm to the study of languages, in which he was so admirably qualified to excel. No man that ever lived, probably, not excepting Sir William Jones himself, has prosecuted this branch of learning to such an extent as Murray. By the end of his short life, scarcely one of either the Oriental or the northern tongues remained uninvestigated by

him, in so far as it was possible to acquire the knowledge of it from sources then accessible in this country. Of the six or seven dialects of the Abyssinian or Ethiopic language in particular, he had made himself certainly much more completely master than any European had ever been before; and this led to his being selected by the booksellers in 1802 to prepare a new edition of Bruce's Travels, which appeared in seven volumes octavo three years after, and at once placed him in the first rank of the Oriental scholars of the age.

In 1806 he left Edinburgh, having been presented to the church of Urr in Dumfries-shire; and here he remained pursuing his favourite studies for six years. "He devoted his leisure moments while at Urr," says a writer to whom he was known,* "to the composition of his stupendous work on the languages of Europe, without communicating his design almost to a single individual; and a person might have spent whole weeks in his company without hearing a word of his favourite pursuits, or of the extent to which, in the department of philology, he had carried his researches." Events, however, at last called him forth from this retirement, to win and for a short time to occupy a more conspicuous station.

In 1812 the professorship of Oriental Languages in the university of Edinburgh became vacant; and Murray's friends immediately seized the opportunity of endeavouring to obtain for him the situation of all others which he seemed especially formed and endowed to fill. Three other candidates, however, also advanced their pretensions; and, as the result of the election depended upon the votes of the members of the town council, or city corporation, a body consisting of thirty-three individuals, the contest soon became a keen and doubtful one. It was eventually carried on between Murray and a single opponent, one of the other candidates having in the most handsome manner withdrawn as soon as he learned that Murray had come forward, and another having found it impossible to command any interest which gave him a

* Literary History of Galloway, by T. Murray, p. 320.

chance of success. A full account of this election, the progress of which was watched by the friends of learning with the deepest anxiety, is given in the Scots Magazine for July 1812. Murray's friends, with Principal Baird at their head, submitted a multitude of testimonials of his qualifications for the vacant chair, as honourable as ever were given to any candidate, whether we look to the decided terms in which they were expressed, or to the authority of the writers. One was from the late Mr. Hamilton, the very eminent professor of Oriental languages in the East India College at Haileybury, in which that gentleman says of Murray, "I happened last week to meet with him in Galloway, and found his acquisitions in Oriental literature and languages so extensive and various as greatly to exceed my power to appreciate them accurately. With the few languages in which I am conversant he discovered an acquaintance that surprised me exceedingly; but the range of his studies included many of which I am completely ignorant." Another was from the late Mr. Salt, one of the most distinguished of modern Orientalists. "My acquaintance with Mr. Murray," says he, "originated in my admiration of the deep erudition and extensive research displayed in his edition of Mr. Bruce's travels in Abyssinia. Having twice visited that country, I was led to pay particular attention to its history and literature, and in these pursuits I received so much assistance from Mr. Murray's labours, that I took an early opportunity, on my return to England in February, 1811, from the mission to Abyssinia in which I had been engaged, to recommend him to the Marquis Wellesley *as the only person in the British dominions*, in my opinion, adequate to translate an Ethiopic letter which I had brought from Ras Willida Selasé, addressed to the king. My recommendation was attended to, and Mr. Murray finished the translation in the most satisfactory way."* There were others, from a host

* After Dr. Murray's death, a pension of 80*l.* a year was bestowed upon his widow by the king, in remembrance of his services on this occasion.

of distinguished names—among which may be mentioned the late Dr. James Gregory, Mr. (afterwards Sir John) Leslie, Mr. (now Lord) Jeffrey, Sir Walter Scott, the late Professors Playfair and Dugald Stewart, &c.—all bearing warm testimony to the general talents and worth of the candidate, even when there was no pretension to be able to appreciate his peculiar scholarship. Well was Murray entitled to say, as he did in a letter written from Urr to one of his most zealous supporters on the day after the election, but before he had learned its result, “If your efforts have been exerted for an unsuccessful candidate, they will not be forgotten, *for we have perished in light!*”

He was elected on the 8th of July by a majority of two votes,* and a few days after the Senate of the University unanimously passed a vote of thanks to Dr. Baird for bringing his pretensions before the patrons, conferring at the same time the degree of Doctor of Divinity upon their new associate. But all these honours came only to make the setting of the luminary more bright. On the 31st of October Dr. Murray entered upon the discharge of his public duties, in a weak state of health, but with an ardour in which all weakness was forgotten. Although declining in strength every day, he continued to teach his classes during the winter, persevering in the preparation and delivery of a course of most learned lectures on Oriental literature, which were attended by crowded and admiring audiences, and even carrying an elementary work through the press for the use of his students. A new impression of his edition of Bruce's Travels also appeared in the beginning of February. Engaged in these labours, he could not be persuaded that he was so ill as he really was; and when Mrs. Murray, who had been left behind him at Urr, urged him to permit her to come to town, it was with difficulty that he was at last brought to consent to her joining him by the 16th of April. Fortunately her affection and her fears impelled her to set

* Of twenty-eight members of the town council who voted, fifteen voted for Murray, and thirteen for his opponent.

out on her journey a few days earlier than the appointed time, and she arrived in Edinburgh on the 13th. She found her husband surrounded by his books and papers, and even engaged in dictating to an amanuensis. But life was now ebbing rapidly: he retired that evening to the bed from which he never rose, and before the close of another day he was among the dead.

Thus perished, in his thirty-eighth year, one who, if he had lived longer, would probably have reared for himself many trophies and extended the bounds of human learning. His ambition had always been to perform in the field to which he more especially dedicated his powers something worthy of remembrance; and his latter years had been given to the composition of a work—his *History of European Languages*, already mentioned—which, if time had been allowed to finish it, would unquestionably have formed a splendid monument of his ingenuity and learning. It has been published since his death, in so far as it could be recovered from his manuscripts; and, although, probably, very far from what it would have been had he lived to arrange and complete it, is still a wonderful display of erudition, and an important contribution to philological literature.

Of Murray's short life, scarcely half was passed amidst those opportunities which usually lead to study and the acquisition of knowledge. The earlier portion of it was a continued struggle with everything that tends most to repress intellectual exertion and to extinguish the very desire of learning; yet in all the poverty and the many other difficulties and discouragements with which he had for his first eighteen years to contend, he went on pursuing his work of self-cultivation, not only as eagerly and steadily, but almost as successfully, as he afterwards did when surrounded by all the accommodations of study. It is a lesson that ought to teach us how independent the mind really is of circumstances, which tyrannize over us chiefly through our habits of submission, and by terrifying us with a mere show of unconquerable resistance. The worst are generally more formidable in their appearance than in their reality, and when courageously at-

tacked are more than half overcome. Had there been any obstacles of a nature sufficient to check the onward course of this enterprising and extraordinary boy, how often would he have been turned back in the noble career upon which he had entered ! But one after another, as they met him, he set his foot upon and crushed ; and at last, after years of patient, solitary, unremitting labour, and of hoping almost against possibility, he was rewarded with all he had wished and toiled for.

CHAPTER XXII.

Self-tuition. Shakspeare; Burns.



Wm. Shakspeare.

It is an interesting train of reflection which is excited by the fact, first noticed by Mr. Malone, that the father of SHAKSPERE could not write his own name, a cross remaining to this day as his mark or signature in the records of the town of Stratford-upon-Avon, of which he was an alderman. Had the great dramatist himself been born half a century earlier, a few rudely scrawled crosses might have been the only efforts in the art of writing of that hand to which we owe so many an immortal page. That Shakspeare's own education, however, embraced not only English reading and writing, but also something of Latin, there can scarcely be a doubt. Dr. Farmer, in a well-known essay, has attempted to shew that he never

had acquired any knowledge of the ancient languages, and owed his acquaintance with classical literature entirely to translations. In this the learned critic certainly goes too far. Shakspeare was evidently a great reader, for his poetry abounds with allusions, more or less accurate, to all the learning of his age, of which not even the most curious and abstruse departments seem to have escaped his attention. Of this any one may convince himself merely by perusing a few pages of the elaborate commentaries that have been written upon his works, and observing how the erudition of succeeding times has exhausted itself, sometimes in vain, in attempting to pursue the excursive range of his memory and his fancy. It may be conceded, however, that his native tongue was probably the only one which he read with much facility, and that to it he was indebted for most of what he knew. And it is not to be overlooked, that in writing his plays, in particular, it was probably deliberately, and upon system, that he preferred taking his version of the ancient story rather from the English translation than from the original author. In those days translations from the ancient tongues appear to have formed, in this country, no small part of the reading of the people, as the numerous performances of this kind which were produced within a few years, some of them by the ablest writers of the time, and the rapid succession of editions of several of them with which the press teemed, may serve to testify. Now it would seem to have been a maxim with Shakspeare always to give his auditors the story that was most familiar to them, and with which they had been longest acquainted, rather than one, the novelty of which they would not so easily comprehend, or with which their old impressions and affections were not so likely to sympathize. Hence, although the most original of all writers in every thing else, he seldom has recourse to his own invention for the plot or story of his drama, but seizes merely upon the popular tale.

Several peculiarities in his style seem clearly to show that he possessed a fair knowledge of the vocabulary

of the Latin language, and its common forms of phraseology ; or about as much as is retained of their school learning by the greater number of those who study the ancient tongues in their youth. This perhaps is, after all, the view of the matter most consistent with the expression of his friend, Ben Jonson, who, in the verses he has written to his memory, represents him, not as entirely ignorant of ancient literature, but only as having had "small Latin, and less Greek."

But, however this may be, Shakspeare must have taken to literature as a profession entirely of his own accord ; and commenced and pursued the business of cultivating his powers by study, in the midst of circumstances very unfavourable to the prosecution of such an aim. Imperfect and uncertain as are the accounts we have of his early years, tradition is uniform in representing him to have led for some time an unsettled life. He has been supposed, when very young, to have been for a short period in the office of a country attorney ; but it is certain that he left his native place, and came up to London, with nothing but chance and his talents to depend upon, when he was about twenty-two years of age, having already a wife, to whom he had been married four or five years before, and several children. He gradually raised himself by his own exertions, till, from an actor, he became a theatrical proprietor ; when after having spent about twenty-six years in London, he returned to his native place, and purchased an estate, where he resided in affluence and respectability till his death.

Unfortunately, we know nothing of Shakspeare's studies, except by their imperishable produce. But, judging from his works, it seems plain that he must have been, as we have already said, an ardent and unwearied reader, a student both of the world of men and of the world of books. Indeed, when he first appeared in London, whatever his mere school education had been, his acquaintance with literature, owing to the nature of his subsequent pursuits, and his scanty opportunities, could not but have been exceedingly circumscribed, and he must have made himself all that he afterwards became.

His whole history, in so far as we know it, goes to prove him to have been, in his maturer days, a person of even and regular habits of life ; first accumulating what was in those times an ample fortune by the sedulous exertions of many years, and then, as soon as he had acquired this competency, wisely bidding adieu to the contests and fatigues of ambition, and retiring from the town and from fame to the country to enjoy it. Nor shall we arrive at a different conclusion with regard to his diligence and application, from a considerate examination of those matchless creations of his fancy, which he has been ignorantly asserted to have thrown off with such a careless and random precipitancy. That a mind so rich and plastic as his formed and gave forth its conceptions with a facility such as slower powers may not emulate, may be easily believed ; but, although very probably a rapid, Shakspeare was certainly not a careless writer. It is curious enough that Jonson himself, to whom has been attributed the expression of a wish that he had blotted much of what he has allowed to remain in his compositions, speaks in the poem already quoted of his

—— “well-torned and true-filed lines ;”

an expression which seems to impute to him rather consummate elaboration than inattention or slovenliness as a writer. The truth may probably be best gathered from the words of his two friends, Heminge and Condell, who, in their address to the reader, prefixed to the first folio edition of the plays, speaking of the author, say, “Who, as he was a happy imitator of nature, was a most gentle expresser of it. His mind and hand went together ; and what he thought, he uttered with that easiness, that we have scarce received from him a blot in his papers.”

It is a common, but a very ill-founded, prejudice, to imagine that anything like regularity or diligence is either impracticable to high genius, or unfavourable to its growth and exercise. Perfect self-control is the crowning attribute of the very highest genius, which so far,

therefore, from unfitting its possessor to submit either in the management of his time or the direction of his thoughts, to the restraints of arrangement and system, enables him, on the contrary, to yield to them as if he felt them not; and which, by exerting this supremacy over itself, achieves, in fact, its greatest triumphs. It is true that its far-seeing eye will often discern the error or inadequacy of theories and rules of discipline, which to a narrower vision may seem perfect and incontrovertible, and will violate them, accordingly, with sufficient audacity. But, when it does so, it is out of no spirit of wanton outrage, or from any inaptitude to take upon itself the obligations of a law: but merely because it must of necessity reject the law that is attempted to be imposed upon it, in order to be enabled to obey a higher and more comprehensive law of its own. It would be well if those would think of this, who, feeling within themselves merely a certain excitement and turbulence of spirit, the token, it may be, of awakening powers, but as certainly the evidence of their immaturity and weakness, mistake their feverish volatility and unsettledness of purpose for what they have been taught to call the lawlessness of genius; and thereupon fancy it is incumbent upon them to fly from all manner of restraint, as perilous to their high prerogative. Genius is neither above law, nor opposed to it; but, provided only that the law to which it is proposed to subject it be one worthy of its obedience, finds its best strength, as well as its most appropriate embellishment, in wearing its fetters. Art, which is the manifestation of genius, is equally the manifestation of judgment; which, instead, therefore, of being something irreconcilable with genius, may, from this truth, be discerned to be not only its most natural ally, but, in all its highest creations, its indispensable associate and fellow-labourer.

The name of Shakspeare naturally recalls that of BURNS, the next greatest poet (unless we reckon Homer in that list) that ever was formed merely or chiefly by the discipline of self-tuition; and also, considered without reference to his poetical powers, another striking



Robert Burns.

example of what a man may do in educating himself, and acquiring an extensive acquaintance with literature, while occupying a very humble rank in society, and even struggling with the miseries of the most cruel indigence. Burns has himself given us a sketch of his early life in a letter to Dr. Moore. His father, a man of a decidedly superior mind, and with even something of literary acquirements beyond his station, had led a life of hard labour and poverty; and at the time of his son Robert's birth was employed as gardener by a gentleman in the neighbourhood of the town of Ayr. A few years afterwards, he took a small farm, on which, however, his utmost exertions, and those of the members of his family who were of an age to give him any assistance, seem to have hardly sufficed to enable him to earn a subsistence without running in debt. "The farm," says his son, "proved a ruinous bargain. . . . My father was advanced in life when he married: I was the eldest of seven children; and he, worn out by early hardships, was unfit for labour. My father's spirit was soon irritated, but not easily broken. There was a freedom in his lease in two

years more ; and to weather these two years we retrenched our expenses. We lived very poorly. I was a dexterous ploughman for my age ; and the next eldest to me was a brother (Gilbert), who could drive the plough very well, and help me to thresh the corn. . . . This kind of life—the cheerless gloom of a hermit, with the unceasing moil of a galley-slave—brought me to my sixteenth year.”

On the expiration of this lease, his father took another farm. “For four years,” continues Burns, “we lived comfortably here ; but a difference commencing between him and his landlord as to terms, after three years’ tossing and whirling in the vortex of litigation, my father was just saved from the horrors of a jail by a consumption, which, after two years’ promises, kindly stepped in, and carried him away *to where the wicked cease from troubling and the weary are at rest.*” Yet it was during this time that the future poet made his first important acquisitions in literature. “I was at the beginning of this period,” says he, “perhaps the most ungainly, awkward boy in the parish—no *solitaire* was less acquainted with the ways of the world. What I knew of ancient story was gathered from Salmon’s and Guthrie’s Geographical Grammars ; and the ideas I had formed of modern manners, of literature, and criticism, I got from the *Spectator.*” He then goes on to enumerate the other books to which his reading extended. The whole formed a sufficiently miscellaneous collection, although not very numerous ; the principal being Pope’s Works, some Plays of Shakspeare, Locke’s Essay on the Human Understanding, Stackhouse’s History of the Bible, Allan Ramsay’s Works, and a collection of English songs. “The collection of songs,” he adds, “was my *vade mecum.* I pored over them driving my cart, or walking to labour, song by song, verse by verse, carefully noting the true tender or sublime, from affectation and fustian. I am convinced I owe to this practice much of my critic craft, such as it is.”

He afterwards went for a few weeks to a village school, where he obtained some acquaintance with the elements of geometry, and the practical sciences of mensuration,

surveying, and dialling. His reading, too, gradually enlarged, as accident threw new books in his way. He mentions, in particular, among those he met with, Thomson's and Shenstone's Works; "and I engaged," says he, "several of my schoolfellows to keep up a literary correspondence with me. This improved me in composition. I had met with a collection of letters, by the wits of Queen Anne's reign, and I pored over them most devoutly. I kept copies of any of my own letters that pleased me; and a comparison between them and the composition of most of my correspondents flattered my vanity."

In a letter from Gilbert Burns, which Dr. Currie has published, we have a still more particular account of the manner in which the father of this humble family struggled, in all his difficulties, to procure education for his children; from which, as interestingly illustrative of the extent to which the poorest have it in their power to discharge this most important parental duty, we shall here transcribe a few sentences. "There being no school near us," says the writer, "and our little services being useful on the farm, my father undertook to teach us arithmetic in the winter evenings, by candlelight; and in this way my two eldest sisters got all the education they received. . . . My father was for some time almost the only companion we had. He conversed familiarly on all subjects with us, as if we had been men; and was at great pains, while we accompanied him in the labours of the farm, to lead the conversation to such subjects as might tend to increase our knowledge, or confirm us in virtuous habits. He borrowed Salmon's Geographical Grammar for us, and endeavoured to make us acquainted with the situation and history of the different countries in the world; while from a book society in Ayr he procured for us the reading of Derham's Physico and Astro Theology, and Ray's Wisdom of God in the Creation, to give us some idea of astronomy and natural history." Gilbert also gives us, in this letter, a more particular account of his brother's early reading. "Robert," he proceeds, "read all these books with an avidity and industry scarcely to

be equalled. My father had been a subscriber to Stackhouse's History of the Bible, then lately published by James Meuross, in Kilmarnock: from this Robert collected a competent knowledge of ancient history; for no book was so voluminous as to slacken his industry, or so antiquated as to damp his researches. A brother of my mother, who had lived with us some time, and had learnt some arithmetic by our winter evening's candle, went into a bookseller's shop in Ayr to purchase the 'Ready Reckoner, or Tradesman's Sure Guide,' and a book to teach him to write letters. Luckily, in place of the 'Complete Letter Writer,' he got by mistake a small collection of letters by the most eminent writers, with a few sensible directions for attaining an easy epistolary style. This book was to Robert of the greatest consequence. It inspired him with a strong desire to excel in letter-writing, while it furnished him with models by some of the first writers in our language."

After mentioning the manner in which his brother obtained a few of his other books, Gilbert goes on to state that a teacher in Ayr, of the name of Murdoch, to whom he was sent for two or three weeks by his father, to improve his writing, being himself engaged at the time in learning French, communicated the instructions he received to his ardent and persevering pupil, who, when he returned home, brought with him a French dictionary and grammar, and a copy of 'Telemachus.' "In a little while," continues the writer, "by the assistance of these books, he had acquired such a knowledge of the language as to read and understand any French author in prose." He afterwards attempted to learn Latin, but did not prosecute the study so long as to make much progress. All this while, the misfortunes and sufferings of this admirable father and his poor family continued to increase every day. Gilbert's picture of their condition is touching in the extreme. "To the buffetings of misfortune," says he, "we could only oppose hard labour, and the most rigid economy. We lived very sparing. For several years butcher's meat was a stranger in the house; while all the members of the family exerted

themselves to the utmost of their strength, and rather beyond it, in the labours of the farm. My brother, at the age of thirteen, assisted in threshing the crop of corn, and at fifteen was the principal labourer on the farm, for we had no hired servant, male or female. The anguish of mind we felt at our tender years, under these straits and difficulties, was very great. To think of our father growing old (for he was now above fifty), broken down with the long-continued fatigues of his life, with a wife and five other children, and in a declining state of circumstances, these reflections produced in my brother's mind and mine sensations of the deepest distress. I doubt not but the hard labour and sorrow of this period of his life, was, in a great measure, the cause of that depression of spirits with which Robert was so often afflicted through his whole life afterwards. At this time he was almost constantly afflicted in the evenings with a dull headache, which, at a future period of his life, was exchanged for a palpitation of the heart, and a threatening of fainting and suffocation in his bed in the night time."

Murdoch, Burns's English master, although not a man of great learning, appears to have been a judicious elementary instructor, as well as to have possessed, in a remarkable degree, that zeal for the improvement of his pupils, and delight in witnessing their progress, which do more, perhaps, than any thing else to render a teacher's efforts successful. In a letter addressed to Mr. Walker, and written some years after the death of the poet, this person says, "Upon this little farm (the first which Burns's father had) was erected an humble dwelling, of which William Burns was the architect. It was, with the exception of a little straw, literally a tabernacle of clay. In this mean cottage, of which I myself was at times an inhabitant, I really believe there dwelt a larger portion of content than in any palace in Europe." In noticing, afterwards, the ease with which his young pupils (Robert being then about six or seven years of age) learned their tasks, he remarks, "This facility was partly owing to the method pursued by their father and

me in instructing them, which was, to make them thoroughly acquainted with the meaning of every word in each sentence that was to be committed to memory. By the bye, this may be easier done, and at an earlier period, than is generally thought. As soon as they were capable of it, I taught them to turn verse into its natural prose order; sometimes to substitute synonymous expressions for poetical words, and to supply all the ellipses. These, you know, are the means of knowing that the pupil understands his author. These are excellent helps to the arrangement of words in sentences, as well as to a variety of expression." In the remainder of the letter the writer gives a very interesting account of the manner in which he and his pupil, at a future period, commenced and carried on their French studies. When Robert Burns was about thirteen years of age, Murdoch had been appointed parish schoolmaster of Ayr, upon which, as we have already mentioned, Burns was sent for a few weeks to attend his school. "He was now with me," says Murdoch, "day and night, in school, at all meals, and in all my walks. At the end of one week I told him, that, as he was now pretty much master of the parts of speech, &c., I should like to teach him something of French pronunciation; that, when he should meet with the name of a French town, ship, officer, or the like, in the newspapers, he might be able to pronounce it something like a French word. Robert was glad to hear this proposal, and immediately we attacked the French with great courage. Now there was little else to be heard but the declension of nouns, the conjugation of verbs, &c. When walking together, and even at meals, I was constantly telling him the names of different objects, as they presented themselves, in French; so that he was hourly laying in a stock of words, and sometimes little phrases. In short, he took such pleasure in learning, and I in teaching, that it was difficult to say which of the two was most zealous in the business; and about the end of the second week of our study of the French, we began to read a little of the *Adventures of Telemachus*, in Fenelon's own words."

Another week, however, was hardly over, when the young student was obliged to leave school for the labours of the harvest. "I did not, however," says Murdoch, "lose sight of him, but was a frequent visitant at his father's house, when I had my half-holiday; and very often went, accompanied by one or two persons more intelligent than myself, that good William Burns might enjoy a mental feast. Then the labouring oar was shifted to some other hand. The father and the son sat down with us, when we enjoyed a conversation, wherein solid reasoning, sensible remark, and a moderate seasoning of jocularity, were so nicely blended, as to render it palatable to all parties. Robert had a hundred questions to ask me about the French, &c.; and the father, who had always rational information in view, had still some question to propose to my more learned friends upon moral or natural philosophy, or some such interesting subject." It is delightful to contemplate such scenes of humble life as these—shewing us, as they do, what the desire of intellectual cultivation may accomplish in any circumstances, and with how much genuine happiness it will irradiate the gloom even of the severest poverty.

We shall not pursue farther the history of Robert Burns. All know his sudden blaze of popularity—the misfortunes and errors of his short life—and the immortality which he has won by his genius. It is plain, from the details that we have given, that, even had he never been a poet, he would have grown up to be no common man. Whatever he owed to nature, it was to his admirable father, and his own zealous exertions, that he was indebted at least for that education of his powers, and that storing of his mind with knowledge, which, in so great a degree, contributed to make him what he afterwards became. It is an error to regard either Burns or Shakspeare as simply a poet of Nature's making. If learning be taken to include knowledge in general, instead of being restricted merely to an acquaintance with the ancient languages, it may be rather said that they were both learned poets—as, indeed, every great poet must be. Their minds, that of Shakspeare especially, were full of

multifarious knowledge, which was the fruit both of vigilant observation and extensive reading, and was perpetually entering into, and, in some degree regulating, the spirit or form of their poetry. The wonder in the case of each was, not that he produced poetical compositions of transcendant excellence without any acquaintance with literature, but that he acquired his literary knowledge in the face of difficulties which would have discouraged most men from making the attempt to gain it. Such minds, too, learn a great deal from a few books, deriving both information and rules of taste from the writers they peruse, with a rapidity and felicity of apprehension which people of inferior endowments cannot comprehend.

GILBERT BURNS, the younger brother of Robert, had no turn for poetry; but he, too, derived infinite benefit from those studies which were intermixed, as we have seen, with the labours of his early days. To this excellent man, who died only a few years ago, literature was the solace of a life of hardships. He never became a scholar in the ordinary sense of the word; his situation, that of a small farmer, did not require that he should give himself to the study of Greek or Latin; but he obtained an extensive acquaintance with the best books in his native language, and learned to write English in a manner that would not have done discredit to a scholar. Some of his letters, indeed, which Dr. Currie has printed, would be ornaments to any collection of epistolary compositions—especially a long one, dated October 1800, which appeared first in Dr. Currie's second edition of the poet's works; and which contains a disquisition on the education of the working classes, abounding in valuable remarks, and characterized by no ordinary powers, both of expression and thought.

CHAPTER XXIII.

[Gifford ; Holcroft.

AMONG narratives which illustrate the power of the Love of Knowledge in overcoming the opposition of circumstances, there are few more interesting than that which has been given us of his early life by the late WILLIAM GIFFORD. Mr. Gifford was born in 1755 at Ashburton, in Devonshire. His father, although the descendant of a respectable and even wealthy family, had early ruined himself by his wildness and prodigality ; and even after he was married had run off to sea, where he remained serving on board a man-of-war for eight or nine years. On his return home, with about a hundred pounds of prize-money he attempted to obtain a living as a glazier, having before apprenticed himself to that business ; but in a few years he died of a broken down constitution before he was forty, leaving his wife with two children, the youngest only about eight months old, and with no means of support except what she might make by continuing the business, of which she was quite ignorant. In about a twelvemonth she followed her husband to the grave. " I was not quite thirteen," says her son, " when this happened ; my little brother was hardly two ; and we had not a relation nor a friend in the world."

His brother was now sent to the workhouse, and he was himself taken home to the house of a person named Carlile, who was his godfather, and had seized upon whatever his mother had left, under pretence of repaying himself for money which he had advanced to her. By this person, William, who had before learned reading, writing, and a little arithmetic, was sent again to school, and was beginning to make considerable progress in the last branch of study ; but in about three months his patron grew tired of the expense, and took him home, with the view of employing him as a ploughboy. An injury,

however, which he had received some years before, on his breast, was found to unfit him for this species of labour; and it was next resolved that he should be sent out to Newfoundland to assist in a storehouse. But upon being presented to the person who had agreed to fit him out, he was declared to be “too small”—and this scheme also had to be abandoned. “My godfather,” says he, “had now humbler views for me, and I had little heart to resist any thing. He proposed to send me on board one of the Torbay fishing-boats: I ventured, however, to remonstrate against this, and the matter was compromised by my consenting to go on board a coaster. A coaster was speedily found for me at Brixham, and thither I went when little more than thirteen.”

In this vessel he remained for nearly a twelvemonth. “It will be easily conceived,” he remarks, “that my life was a life of hardship. I was not only ‘a ship-boy on the high and giddy mast,’ but also in the cabin, where every menial office fell to my lot; yet, if I was restless and discontented, I can safely say it was not so much on account of this, as of my being precluded from all possibility of reading; as my master did not possess, nor do I recollect seeing during the whole time of my abode with him, a single book of any description except the ‘Coasting Pilot.’”

While in this humble situation, however, and seeming to himself almost an outcast from the world, he was not altogether forgotten. He had broken off all connexion with Ashburton, where his godfather lived; but “the women of Brixham,” says he, “who travelled to Ashburton twice a-week with fish, and who had known my parents, did not see me without kind concern running about the beach in a ragged jacket and trowsers.” They often mentioned him to their acquaintances at Ashburton; and the tale excited so much commiseration in the place, that his godfather at last found himself obliged to send for him home. At this time he wanted some months of fourteen. He proceeds with his own story as follows:—

“After the holidays I returned to my darling pursuit—arithmetic: my progress was now so rapid that in a few

months I was at the head of the school, and qualified to assist my master (Mr. E. Furlong) on any extraordinary emergency. As he usually gave me a trifle on those occasions, it raised a thought in me that, by engaging with him as a regular assistant, and undertaking the instruction of a few evening scholars, I might, with a little additional aid, be enabled to support myself. God knows, my ideas of support at this time were of no very extravagant nature. I had, besides, another object in view. Mr. Hugh Smerdon (my first master) was now grown old and infirm: it seemed unlikely that he should hold out above three or four years; and I fondly flattered myself that, notwithstanding my youth, I might possibly be appointed to succeed him. I was in my fifteenth year when I built these castles: a storm, however, was collecting, which unexpectedly burst upon me, and swept them all away.

“On mentioning my little plan to Carlile, he treated it with the utmost contempt; and told me, in his turn, that, as I had learned enough, and more than enough, at school, he must be considered as having fairly discharged his duty (so, indeed, he had); he added, that he had been negotiating with his cousin, a shoemaker of some respectability, who had liberally agreed to take me without a fee as an apprentice. I was so shocked at this intelligence that I did not remonstrate; but went in sullenness and silence to my new master, to whom I was soon after bound,* till I should attain the age of twenty-one.”

Up to this period his reading had been very limited, the only books he had perused, beside the Bible, with which he was well acquainted, having been a black-letter romance, called *Parismus* and *Parismenes*, a few old magazines, and the *Imitation of Thomas à Kempis*. “As I hated my new profession,” he continues, “with a perfect hatred, I made no progress in it; and was consequently little regarded in the family, of which I sank by

* “My indenture, which now lies before me, is dated the 1st of January, 1772.”

degrees into the common drudge : this did not much disquiet me, for my spirits were now humbled. I did not, however, quite resign my hope of one day succeeding to Mr. Hugh Smerdon, and therefore secretly prosecuted my favourite study at every interval of leisure. These intervals were not very frequent ; and, when the use I made of them was found out, they were rendered still less so. I could not guess the motives for this at first ; but at length I discovered that my master destined his youngest son for the situation to which I aspired.

“ I possessed at this time but one book in the world : it was a treatise on algebra, given to me by a young woman, who had found it in a lodging-house. I considered it as a treasure ; but it was a treasure locked up ; for it supposed the reader to be well acquainted with simple equations, and I knew nothing of the matter. My master’s son had purchased ‘ Fenning’s Introduction : ’ this was precisely what I wanted—but he carefully concealed it from me, and I was indebted to chance alone for stumbling upon his hiding-place. I sat up for the greatest part of several nights successively, and, before he suspected that his treatise was discovered, had completely mastered it. I could now enter upon my own ; and that carried me pretty far into the science. This was not done without difficulty. I had not a farthing on earth, nor a friend to give me one ; pen, ink, and paper, therefore, (in despite of the flippant remark of Lord Orford,) were, for the most part, as completely out of my reach as a crown and sceptre. There was, indeed, a resource ; but the utmost caution and secrecy were necessary in applying to it. I beat out pieces of leather as smooth as possible, and wrought my problems on them with a blunted awl ; for the rest, my memory was tenacious, and I could multiply and divide by it to a great extent.”

No situation, it is obvious, could be more unfavourable for study than this ; and yet we see how the eager student succeeded in triumphing over its disadvantages, contriving to write and calculate even without paper, pens, or ink, by the aid of a piece of leather and a blunted awl. Where there is a strong determination to attain an object, it is

generally sufficient of itself to create the means; and almost any means are sufficient. We mistake in supposing that there is only one way of doing a thing, namely, that in which it is commonly done. Whenever we have to prove it, we find how rich in resources is Necessity; and how seldom it is that, in the absence of the ordinary instrument, she has not some new invention to supply its place. This is a truth which studious poverty has often had experience of, and been all the better for experiencing; for difficulties so encountered and subdued not only whet ingenuity, but strengthen a man's whole intellectual and moral character, and fit him for struggles and achievements in after life, from which other spirits less hardily trained turn away in despair.

At last, however, Gifford obtained some alleviation of his extreme penury. He had scarcely, he tells us, known poetry even by name, when some verses, composed by one of his acquaintances, tempted him to try what he could do in the same style, and he succeeded in producing a few rhymes. As successive little incidents inspired his humble muse, he produced several more compositions of a similar description, till he had got together about a dozen of them. "Certainly," says he, "nothing on earth was ever so deplorable;" but such as they were they procured him not a little fame among his associates, and he began at last to be sometimes invited to repeat them to other circles. "The repetitions of which I speak," he continues, "were always attended with applause, and sometimes with favours more substantial; little collections were now and then made, and I have received sixpence in an evening. To one who had long lived in the absolute want of money, such a resource seemed a Peruvian mine: I furnished myself by degrees with paper, &c., and, what was of more importance, with books of geometry and of the higher branches of algebra, which I cautiously concealed. Poetry, even at this time, was no amusement of mine: it was subservient to other purposes; and I only had recourse to it when I wanted money for my mathematical pursuits."

But even this resource was soon taken from him. His

master, having heard of his verse-making, was so incensed both at what he deemed the idleness of the occupation, and especially at some satirical allusions to himself, or his customers, upon which the young poet had unwisely ventured, that he seized upon and carried away all his books and papers, and even strictly prohibited him from ever again repeating a line of his compositions. This severe stroke was followed by another, which reduced him to utter despair. The master of the free-school, to whom he had never resigned the hope of succeeding, died, and another person was appointed to the situation not much older than Gifford, and who, he says, was certainly not so well qualified for it as himself. "I look back," he proceeds, "on that part of my life which immediately followed this event with little satisfaction; it was a period of gloom, and savage unsociability: by degrees I sunk into a kind of corporeal torpor; or, if roused into activity by the spirit of youth, wasted the exertion in splenetic and vexatious tricks, which alienated the few acquaintances which compassion had yet left me."

But his despondency and discontent seem to have gradually given way to the natural buoyancy of his disposition; some evidences of kindly feeling from those around him tended a good deal to mitigate his recklessness; and, especially as the term of his apprenticeship drew towards a close, his former aspirations and hopes began to return to him. He had spent, however, nearly six years at his uncongenial employment, before any decided prospect of deliverance opened upon him. "In this humble and obscure state," says he, "poor beyond the common lot, yet flattering my ambition with day dreams which perhaps would never have been realized, I was found, in the twentieth year of my age, by Mr. William Cookesley, — a name never to be pronounced by me without veneration. The lamentable doggrel which I have already mentioned, and which had passed from mouth to mouth among people of my own degree, had by some accident or other reached his ear, and given him a curiosity to inquire after the author." Mr. Cookesley, who was a

surgeon, and not rich, having learnt Gifford's history from himself, became so much interested in his favour, that he determined to rescue him from his obscurity. "The plan," says Gifford, "that occurred to him was naturally that which had so often suggested itself to me. There were, indeed, several obstacles to be overcome. My hand-writing was bad, and my language very incorrect; but nothing could slacken the zeal of this excellent man. He procured a few of my poor attempts at rhyme, dispersed them amongst his friends and acquaintance, and, when my name was become somewhat familiar to them, set on foot a subscription for my relief. I still preserve the original paper; its title was not very magnificent, though it exceeded the most sanguine wishes of my heart. It ran thus: 'A subscription for purchasing the remainder of the time of William Gifford, and for enabling him to improve himself in writing and English grammar.' Few contributed more than five shillings, and none went beyond ten and sixpence,—enough, however, was collected to free me from my apprenticeship,* and to maintain me for a few months, during which I assiduously attended the Rev. Thomas Smerdon."

The rest of the story may be very compendiously told. The difficulties of the poor scholar were now over, for his patrons were so much pleased with the progress he made during this short period, that, upon its expiration, they renewed their bounty, and maintained him at school for another year. "Such liberality," he remarks, "was not lost upon me; I grew anxious to make the best return in my power, and I redoubled my diligence. Now that I am sunk into indolence, I look back with some degree of scepticism to the exertions of that period." In two years and two months from what he calls the day of his emancipation, he was pronounced by his master to be fit for the University: and, a small office having been obtained for him by Mr. Cookesley's exertions at Oxford, he was entered of Exeter College, that gentleman undertaking to provide the additional means necessary to enable

* "The sum my master received was six pounds."

him to live till he should take his degree. Mr. Gifford's first patron died before his protégé had time to fulfil the good man's fond anticipations of his future celebrity; but he afterwards found, in Lord Grosvenor, another much more able, though it was impossible that any other could have shown more zeal, to advance his interests. A long and prosperous life, during which he acquired a distinguished name in the literary world, was the ample compensation for the humiliation and hardships of his youth. He was the Editor, for many years, of the 'Quarterly Review,' which was placed under his management at its commencement in 1809; and which attained the most distinguished success, in a great degree through his judicious and careful attention to its conduct. The narrative from which we have extracted the preceding pages, and which is so interestingly written that we have generally preferred retaining the original words in our abridgment, is prefixed to his English version of Juvenal, the first edition of which appeared in 1802. Mr. Gifford died in London on the 31st of December, 1826, in the seventy-first year of his age. It is a beautiful circumstance in his history, and one which shews how a generous act sometimes receives a worldly reward, that he left the bulk of his fortune to the son of his first most kind and disinterested patron, Mr. Cookesley.

Similar in some respects to Gifford's early history is that of his contemporary THOMAS HOLCROFT, the author of 'Hugh Trevor,' and many other well known productions in light literature. Holcroft has also left us part of a memoir of his own life, the composition of which, however, he commenced too late to live to finish. "How much he had it at heart," says the editor of the manuscript, which was given to the world some years after the death of the author, "may, however, be inferred from the extraordinary pains he then took to make some progress in it. He told his physicians that he did not care what severity of treatment he was subjected to, provided he could live six months longer to complete what he had begun. By dictating a word at a time, he succeeded in bringing it down to his fifteenth year. When

the clearness, minuteness, and vividness of what he thus wrote, are compared with the feeble, half-convulsed state in which it was written, it will be difficult to bring a stronger instance of the exertion of resolution and firmness of mind under such circumstances."

Holcroft was born in London in the year 1745, at which time his father wrought as a shoemaker, and his mother dealt in greens and oysters. His father, who seems to have been a person of unsettled habits, though a well-meaning and upright man, knew very little of his business, to which he had not been regularly bred, and, in spite of the exertions both of himself and his wife, his affairs did not prosper. When young Holcroft was about six years old, the family were suddenly removed from London to a place in Berkshire beyond Ascot Heath, where they remained for about twelve months. Thomas had as yet only been for a short time at a school where children were sent rather to keep them out of harm's way than to learn anything, and to which he used to be carried by an apprentice of his father's. This lad afterwards gained his warmest gratitude by making him a present of the first two books he ever possessed, the one being the History of Parismus and Parismenes, already mentioned as one of Gifford's early literary companions, and the other the Seven Champions of Christendom. It was while they resided in Berkshire that his father began teaching him to read. "The task," says he, "at first I found difficult, till the idea one day suddenly seized me, of catching all the sounds I had been taught from the arrangement of the letters; and my joy at this discovery was so great, that the recollection of it has never been effaced. After that my progress was so rapid that it astonished my father. He boasted of me to every body; and, that I might lose no time, the task he set me was eleven chapters a day in the Old Testament. I might, indeed, have deceived my father by skipping some of the chapters, but a dawning regard for truth, aided by the love I had of reading, and the wonderful histories I sometimes found in the Sacred Writings, generally induced me to go through the whole of my task.

One day as I was sitting at the gate with my Bible in my hand, a neighbouring farmer, coming to see my father, asked me if I could read the Bible already. I answered, yes; and he desired me to let him hear me. I began at the place where the book was open, read fluently, and afterwards told him, that, if he pleased, he should hear the tenth chapter of Nehemiah. At this he seemed still more amazed, and, wishing to be convinced, bade me read. After listening till he found I could really pronounce the uncouth Hebrew names so much better, and more easily, than he supposed to be within the power of so young a child, he patted my head, gave me a penny, and said I was an uncommon boy. It would be hard to say whether his praise or his gift was most flattering to me. Soon after, my father's apprentice, the kind-hearted Dick, who came backward and forward to my father on his affairs, brought me the two delightful histories I have above mentioned, which were among those then called Chapman's Books. It was scarcely possible for anything to have been more grateful to me than this present. Parismus and Parismenes, with all the adventures detailed in the Seven Champions of Christendom, were soon as familiar to me as my catechism, or the daily prayers I repeated kneeling before my father."

On leaving their house in Berkshire, the family were obliged to adopt a wandering life, the mother turning pedlar, and hawking her wares through the outskirts and neighbourhood of London, while her son trotted after her, and the father, after a vain attempt to obtain some regular employment, in a short time joining the party, who now extended their peregrinations to remote parts of the country. While leading this life, they endured the greatest hardships; and upon one occasion were so severely pressed, that Thomas was sent to beg from house to house in a village where they happened to be. At length the father managed to buy two or three asses, which he loaded with hampers of apples and pears, and drove about through the country. But this apparent improvement in their circumstances afforded no alleviation to the sufferings of the poor boy. "The bad nourish-

ment I met with," says he; "the cold and wretched manner in which I was clothed; and the excessive weariness I endured in following these animals day after day, and being obliged to drive creatures perhaps still more weary than myself, were miseries much too great, and loaded my little heart with sorrows far too pungent ever to be forgotten. Bye roads and high roads were alike to be traversed, but the former far the oftenest, for they were then almost innumerable, and the state of them in winter would scarcely at present be believed." Once, he tells us he travelled on foot thirty miles in one day; and he was at this time only a child of about ten years old. During all this time, he made little or no progress in reading—"I was too much pressed," he says, "by fatigue, hunger, cold, and nakedness." Yet as he continued to repeat his prayers and catechism morning and evening, and to read the prayer-book and Bible on Sundays, he, at least, did not forget what he had formerly learned. On one occasion, too, he states, that the ballad of Chevy Chace having fallen into his hands, his father, who was very proud of what he conceived to be his son's talents, and particularly of his memory, set him to get by heart the whole song, by way of task, which he performed, in the midst of his toils, in three days. His father gave him a halfpenny for the achievement, which made him think himself at the time quite a rich man.

When in his eleventh or twelfth year, having been present at the Nottingham races, he was so much struck by the contrast between his own mean and ragged condition, and that of the clean, well-fed, and well-clothed stable-boys, that he determined to try if he could not find a master to engage him in that capacity at Newmarket. After much perseverance, and being turned off upon a short trial, first by one master and then by another, from the little knowledge he was found to have of riding, he was at last taken into the service of a person who was considerate enough not to expect him to be a finished groom almost before he could have ever mounted a horse. He very soon began to distinguish himself by his ex-

pertness in his new occupation ; and the language in which he speaks of his change of circumstances forcibly paints his sense of the miseries from which he had been extricated. Alluding to the hearty meal which he and his companions were wont to make every morning at nine o'clock, after four hours' exercise of their horses, he says, " Nothing, perhaps, can exceed the enjoyment of a stable-boy's breakfast : what, then, may not be said of mine, who had so long been used to suffer hunger, and so seldom found the means of satisfying it ? " " For my own part," he adds, " so total and striking was the change which had taken place in my situation, that I could not but feel it very sensibly. I was more conscious of it than most boys would have been, and therefore not a little satisfied. The former part of my life had most of it been spent in turmoil, and often in singular wretchedness. I had been exposed to every want, every weariness, and every occasion of despondency, except that such poor sufferers become reconciled to, and almost insensible of, suffering ; and boyhood and beggary are fortunately not prone to despond. Happy had been the meal where I had enough ; rich to me was the rag that kept me warm ; and heavenly the pillow, no matter what, or how hard, on which I could lay my head to sleep. Now I was warmly clothed, nay gorgeously ; for I was proud of my new livery, and never suspected that there was disgrace in it ; I fed voluptuously, not a prince on earth perhaps with half the appetite, and never-failing relish ; and, instead of being obliged to drag through the dirt after the most sluggish, obstinate, and despised among our animals, I was mounted on the noblest that the earth contains, had him under my care, and was borne by him over hill and dale, far outstripping the wings of the wind. Was not this a change such as might excite reflection even in the mind of a boy ? "

We must, however, pass over the account which he gives of his life as a stable-boy, interesting as many of the details are into which he enters. During his wanderings through the country with his father, as has been already mentioned, he had scarcely had any opportunity

of extending his knowledge of books; the Bible, and such old ballads as he met with by chance on the walls of cottages and ale-houses, constituting all his reading. "Books were not then," he remarks, "as they fortunately are now, great or small, on this subject or on that, to be found in almost every house. A book, except of prayers, or of daily religious use, was scarcely to be seen but among the opulent, or in the possession of the studious; and by the opulent they were often disregarded with a degree of neglect which would now be almost disgraceful." For some time after his arrival at Newmarket, he was not much better off. In about half a year, however, his father followed him to that place, where he at first found a little employment at his old trade of making shoes; and one of his shopmates, who happened to be fond of books, and to be in possession of a few, occasionally lent young Holcroft a volume from his collection. Among other works, this person put into his hands *Gulliver's Travels*, and the *Spectator*, with which, the former especially, he was much delighted. He mentions, also, the *Whole Duty of Man*, the *Pilgrim's Progress*, and other religious books, as at this time among his chief favourites. As he was one day passing the church, he heard some voices singing, and was immediately seized with a strong desire to learn the art. Having approached the church door, he found the persons within engaged in singing in four parts, under the direction of a Mr. Langham. They asked him to join them, and his voice and ear being pronounced good, it was agreed that he should be taken into the class; the master offering to give up the entrance money of five shillings, in consideration of his being but a boy, whose wages could not be great, and the others agreeing to let him sing out of their books. "From the little," he proceeds, "I that day learned, and from another lesson or two, I obtained a tolerable conception of striking intervals upwards or downwards, such as the third, the fourth, and the remainder of the octave, the chief feature in which I soon understood; but of course I found most difficulty in the third, sixth, and seventh. Previously, however, to any great progress

was obliged to purchase 'Arnold's Psalmody;' and, studious over this divine treasure, I passed many a forenoon extended in the hay-loft. My chief, and almost my only difficulty, lay in the impenetrable obscurity of such technical words as were not explained either by their own nature, or by the author in other language. I was illiterate; I knew the language of the vulgar well, but little more. Perhaps no words ever puzzled poor mortal more than I was puzzled by the words, *major* and *minor keys*. I think it a duty, which no one who writes an elementary book ought to neglect, to give a vocabulary of all the words which are not in common use, in the language in which he writes, and to explain them by the simplest terms in that language; or, if that cannot be done, by a clear and easy paraphrase. The hours I spent by myself in mastering whatever belonged to notation, and in learning the intervals, occasioned my progress to be so very different from that of the others, that it excited the admiration of them all; and Mr. Langham, the great man whom I then looked up to, declared it was surprising. If any part was out, I heard it immediately, and often struck the note for them,—getting the start of Mr. Langham. If he should happen to be absent, he said that I could set them all right; so that by this, and the clearness of my voice, I obtained the nickname of 'The sweet singer of Israel.' ”

His wages were four pounds a year, and he paid five shillings a quarter to his singing master; but, upon Mr. Langham offering to give him lessons in arithmetic also for as much more, he agreed to the proposal, and attended him daily for three months. In that time he got so far as Practice and the Rule-of-Three. “Except what I have already related,” says he, “these three months, as far as others were concerned, may be truly called my course of education. At the age of two or three and thirty, indeed, when I was endeavouring to acquire the French language, I paid a Monsieur Raymond twenty shillings for a few lessons, but the good he did me was so little that it was money thrown away. At Newmarket I was so intent on studying arithmetic, that

for want of better apparatus I have often got an old nail and cast up sums on the paling of the stable-yard." This will remind the reader of Gifford, with his leather for paper, and his blunted awl for a pen.

Holcroft continued at Newmarket for about two years and a half, when he determined to go to London once more to join his father, who now kept a cobbler's stall in South Audley Street. "My mind," he says, "having its own somewhat peculiar bias, circumstances had rather concurred to disgust me than to invite my stay. I despised my companions for the grossness of their ideas, and the total absence of every pursuit in which the mind appeared to have any share. It was even with sneers of contempt that they saw me intent on acquiring some small portion of knowledge, so that I was far from having any prompter either as a friend or a rival." He was at this time nearly sixteen. For some years he continued to make shoes with his father, and at last became an able workman. But he grew every day fonder of reading, and, whenever he had a shilling to spare, spent it, we are told, in purchasing books. In 1765, having married, he attempted to open a school for teaching children to read at Liverpool, but was obliged to abandon the project in about a year, when he returned to town, and resumed his trade of a shoemaker. Beside his dislike to this occupation, however, on other accounts, it brought back an asthmatic complaint he had had when a boy, and every consideration made him resolve to endeavour to escape from it. Even at this time he had become a writer for the newspapers, the editor of the 'Whitchall Evening Post' giving him five shillings a column for some essays which he sent to that journal. He again attempted to open a school in the neighbourhood of London; but after living for three months on potatoes and butter-milk, and obtaining only one scholar, he once more returned to town. Having acquired some notions of elocution at a debating club which he had been in the habit of attending, he next thought of going on the stage, and obtained an engagement from the manager of

the Dublin theatre, at a poor salary, which was very ill paid. He was so ill treated, indeed, in this situation, that he was obliged to leave it in about half a year. He then joined a strolling company in the north of England, and wandered about as an itinerant actor for seven years, during which time he suffered a great deal of misery, and was often reduced almost to starving. In the midst of all his sufferings, however, he retained his love of books, and had made himself extensively conversant with English literature. At last, in the end of the year 1777, he came up to London, and, by means of an introduction to Mr. Sheridan, obtained an engagement in a subordinate capacity at Drury Lane. He had just before this, as a desperate resource, sat down to compose a farce, which he called 'The Crisis,' and this turned out the commencement of a busy and extended literary career. The farce, although only acted once, was well received, and it soon encouraged him to new efforts of the same kind; yet he continued for many years involved in difficulties, from which it required all his exertions to extricate himself. The remainder of Mr. Holcroft's history, with the exception of a short but stormy period, during which he was subjected to very severe usage on account of certain political opinions which he was supposed to hold, is merely that of a life of authorship. He never became a good actor, and after some time dedicated himself entirely to literary occupation. His industry in his new profession is abundantly evidenced by the long list of his works, which comprise several of high talent and established popularity. In his maturer years, beside many other acquirements, he made himself master of the French and German languages, from both of which he executed several well-known translations.*

Mr. Holcroft died in 1809. His life is in many respects admirably calculated to answer the design which

* Among others, that of Mad. Genlis's 'Veillées du Château,' which he renders, incorrectly, 'Tales of the Castle,' instead of 'Evenings of (or, at) the Country House.'

he had in view, he tells us, in writing the account of the early part of it, namely,—“to excite an ardent emulation in the breasts of youthful readers, by shewing them how difficulties may be endured, how they may be overcome, and how they may at last contribute, as a school of instruction, to bring forth hidden talent.”

CHAPTER XXIV.

Amusement in the Pursuit of Knowledge. Pursuit of Knowledge by persons of rank or wealth: Democritus; Anaxagoras; Nicephorus Alphery; Marcus Aurelius; Julian; Charlemagne; Alfred; James I. of Scotland; Elizabeth; Alphonso X.

MANY of the examples we have given show that the moral habits which the Pursuit of Knowledge has a tendency to create and foster form one of its chief recommendations. Knowledge is, essentially and directly, power; but it is also, indirectly, virtue. And this it is in two ways. It can hardly be acquired without the exertion of several moral qualities of high value; and, having been acquired, it nurtures tastes, and supplies sources of enjoyment, admirably adapted to withdraw the mind from unprofitable and corrupting pleasures. Some distinguished scholars, no doubt, have been bad men; but we do not know how much worse they might have been but for their love of learning, which, to the extent it did operate upon their characters, could not have been otherwise than beneficial. A genuine relish for intellectual enjoyments is naturally as inconsistent with a devotion to the coarser gratifications of sense as the habit of assiduous study is with that dissipation of time, of thought, and of faculty, which a life of vicious pleasure implies.

But knowledge is also happiness, as well as power and virtue;—happiness both in the acquisition and in the possession; and, were the pursuit of it nothing better than a mere amusement, it would deserve the preference over all other amusements on many accounts. Of these, indeed, the chief is, that it must almost of necessity become something better than an amusement,—must invigorate the mind as well as entertain it, and refine and elevate the character while it gives to listlessness and weariness their most agreeable excitement and relaxation. But, omitting this consideration, it is still of all amuse-

ments the best, for other reasons. So far from losing any part of its zest with time, the longer it is known the better it is loved. There is no other pastime that can be compared with it in variety. Even to him who has been longest conversant with it, it has still as much novelty to offer as at first. It may be resorted to by all, in all circumstances; by both sexes, by the young and the old, in town or in the country, by him who has only his stolen half hour to give to it, and by him who can allow it nearly his whole day, in company with others or in solitude, which it converts into the most delightful society. Above all, it is the cheapest of all amusements, and consequently the most universally accessible. Causes which will suggest themselves to the reflection of every reader, and which, therefore, we need not here stop to explain, have hitherto, in a great measure, excluded our labouring population from the enjoyment of science and literature; but this state of things is passing away, and the habit of reading is extending itself rapidly, even among the humblest ranks. Nothing can be more natural than this. A book is emphatically the poor man's luxury, for it is of all luxuries that which can be obtained at the least cost. By means of itinerating libraries for the country, and stationary collections for each of our larger towns, almost every individual of the population might be enabled to secure access for himself to an inexhaustible store of intellectual amusement and instruction, at an expense which even the poorest would scarcely feel. As yet these advantages have been chiefly in the possession of the middle classes, to whom they have been a source not more of enjoyment than of intelligence and influence.

Among the highest orders of society, the very cheapness of literary pleasures has probably had the effect of making them to be less in fashion than others of which wealth can command a more exclusive enjoyment. Even such distinction as eminence in intellectual pursuits can confer must be shared with many of obscure birth and low station, and on that account alone has doubtless seemed often the less worthy of ambition to those who were already raised above the crowd by the accidents of

fortune. Yet, whatever enjoyment there may really be in such pursuits will not, of course, be the less to any one because he happens to be a person of wealth or rank. On the contrary, these advantages are perhaps on no other account more valuable than for the power which they give their possessor of prosecuting the work of mental cultivation to a greater extent than others. He has, if he chooses, a degree of leisure, and freedom from interruption, greatly exceeding what the generality of men enjoy. Others have seldom more than the mere fragments of the day to give to study, after the bulk of it has been consumed in procuring merely the bread that perisheth; he may make literature and philosophy the vocation of his life. To be enabled to do this, or to do it only in small part, many have willingly embraced comparative poverty in preference to riches. Among the philosophers of the ancient world, some are said to have spontaneously disencumbered themselves of their inheritances, that the cares of managing their property might not interrupt their philosophic pursuits. Crates, Thales, Democritus, Anaxagoras, are particularly mentioned as having made this sacrifice. But in those days, it is to be remembered, knowledge was only to be obtained by travelling into foreign countries, and those who sought it were therefore obliged, before setting out on the search, either to relinquish altogether the possessions they had at home, or to leave them in charge of trustees, who generally took advantage of their stewardship to embezzle or squander them. Doubtless no one of the celebrated persons we have enumerated would have thrown away his patrimony, if he could have retained it with as little inconvenience as such an incumbrance can possibly occasion a philosopher in our own times. The only worldly imprudence even of which they can be fairly accused, is, that of having preferred knowledge to wealth, when it was necessary to make a choice between the two; or that of having allowed themselves to be too easily cheated of the latter, in their enthusiastic devotion to the former. Bayle, who had himself a strong sympathy with this love of a quiet in preference to a splendid life, states the

matter correctly in the case of Democritus, when he says, in his article on that great father of natural philosophy, “The spirit of a great traveller reigned in him; he journeyed to the heart of India in quest of the riches of learning, and bestowed but little thought on those other treasures which he had almost at his door.” Anaxagoras, in like manner, although he did not travel so far from home as Democritus, still owed the loss of his property to his being obliged to leave it in the hands of others. This ingenious but somewhat fanciful speculator, the master of Socrates and Euripides, and the honoured friend of Pericles, was a native of Clazomenæ in Ionia, and the descendant of noble and wealthy ancestors, whose lands he inherited; but, determining to devote his life to philosophy, he did not hesitate, when only about twenty years of age, to bid adieu to his fair possessions, and, crossing the Ægean, to repair to Athens, where he continued to pursue his studies while his estate was running to waste, and at last maintained himself by giving lessons to others. Cicero mentions Anaxagoras, along with Pythagoras and Democritus, as having declined those public honours, and that share in the management of affairs, to which his birth and qualifications entitled him to aspire, “for the sake,” as he expresses it, “of tranquillity, and for the sake of the sweetness of knowledge, than which nothing is to man more delightful”—*propter tranquillitatem, et propter ipsius scientiæ suavitatem, qua nihil est hominibus jucundius*.* This is the testimony of one who had himself tasted the charms of political power as well as those of philosophy.†

We may here notice the singular story of NICEPHORUS ALPHERY, as related in the Biographia Britannica. Alphery was born in Russia about the close of the sixteenth century, of the family of the Czars. He was, we suppose, of the ancient race of Ruric, which, after occu-

* De Oratore, lib. iii.

† In modern times, Alfieri, the great Italian dramatist, gave up his estate to his sister, in order not to be distracted, by the management of it, from his poetical studies.

pying the throne for nearly eight centuries, gave place to a new dynasty on the death of Feodore Iwanovitch, commonly called Feodore I., in 1598. This event, which was immediately followed by the usurpation of Boris Godunow, after he had caused Feodore's only brother Demetrius, the heir to the crown, to be assassinated, was the occasion of protracted troubles to Russia. It appears to have been about the commencement of these convulsions that Alphery and his two brothers were sent by their friends for safety to England, and entrusted to the care of a merchant, connected by commercial relations with their native country. Their protector gave them a liberal education, and at the proper age they were all entered of the University of Oxford. Soon after this, however, two of them were attacked by small pox and died. Nicephorus, the survivor, now resolved to take orders in the English church, and accordingly, having been ordained, he was appointed in 1618 to the living of Wooley, in Huntingdonshire, the income of which was barely sufficient to afford him a maintenance. By this time the throne of his ancestors was in the possession of Michael Fedrowitch Romanow, who was the son of a patriarch of the Greek church, and had, in 1613, when only sixteen years of age, obtained the imperial crown, which has ever since been worn by his descendants. Thus, while on the one hand the church had received into her ranks the heir of an empire, that empire on the other hand received a sovereign from the church. The disturbances that had so long distracted Russia, however, were not settled by the accession of Michael; and it is asserted that subsequently to this period Nicephorus was actually twice invited to return to his native country, and put himself at the head of a powerful party who desired to place him on the throne. But, with a want of ambition which many will despise, although its wisdom might perhaps be defended, he preferred on both occasions his humble parsonage to this splendid temptation. Never having obtained any additional preferment, he long made himself happy by the discharge of his duties in the lowly condition he had embraced; and his meek

spirit was probably but rarely troubled even by a thought of the exalted station to which he once might have attained. After settling at Wooley he married, and had a family. Alphery was not destined, however, even by his relinquishment of the rights of his birth, to escape the storms of political commotion; for on the ascendancy of the republican party after the civil wars he was deprived of his living, and, with his wife and children, compelled to wander about for some time without a home; nor did he recover his benefice till the Restoration. By this time the infirmities of advanced age had left him but little strength for the performance of his wonted duties; and, leaving his parish in charge of a curate, he soon after retired to Hammersmith, to the house of one of his sons who was settled there. In this retreat he lived for some years, unnoticed, but not unhappy; and, when his death took place at last, his singular fortunes had been so much forgotten by all the world that nobody has recorded the date of the event.

We read nothing of any remarkable acquirements in literature made by this individual; but, if moderation of desires be a quality of the philosophic spirit, he is entitled to be regarded as no ordinary philosopher. Many others, however, might be enumerated, who even on a throne have cultivated science and letters, and intermingled the occupations of study with those of sovereignty. We may mention among the Roman emperors the excellent MARCUS AURELIUS, a prince who, with some failings, mani-



Coin of Aurelius.

fested many virtues that have rarely adorned in the same degree either a public or private station. Called to the imperial dignity contrary to his own wishes, Aurelius, who had been a philosopher before his exaltation, remained the same in character, and as far as possible in habits, after he became the master of the world; and he is at least one instance of a naturally good disposition which power the most unbounded was unable to corrupt. To our common notions, or prejudices, his giving his attendance, when nearly sixty years of age, to a course of philosophical lectures may seem to savour something of pedantic display: but kings have often been worse employed; and it is at any rate delightful to find this good and enlightened emperor, after his victorious campaigns, repairing, ere he returned home to receive the congratulations of his impatient Romans, to the mother-city of philosophy, learning, art, and freedom, the subjugated but still illustrious Athens, and there examining the trophies of her old glory, mixing in her religious processions and ceremonies, rebuilding and re-endowing her schools, bestowing new honours and privileges on the teachers, and neglecting nothing that could make her once more the metropolis of the world of letters. Marcus Aurelius is said to have written several books; but only one work, his 'Moral Reflections,' composed in Greek, has come down to us. How happy would nations be, this prince was wont to exclaim in the words of Plato, if the philosophers were their kings, or their kings were philosophers. And he afforded in himself, equally able as was his administration of affairs at home and abroad, in peace and in war, at least one splendid exemplification of the truth of his favourite remark—which yet might not be found to hold generally good, unless philosophy were to include, as it did in him, practice as well as speculation. The emperor JULIAN, in a later age, though perhaps equalling Marcus Aurelius in literary talents and accomplishments, and endowed also with many great qualities by nature, does not exhibit to us quite so beautiful a picture of philosophy on a throne. He had neither the simplicity, sincerity, and perfect

truthfulness of his predecessor's moral character, nor the unimpassioned sagacity and clearness of vision which distinguished his understanding ; and is chargeable indeed with acting in many respects in a spirit of affectation and blind prejudice, anything but creditable to a philosopher. Yet, during his short reign of little more than a year and a half, Julian proved himself both an able monarch and a man possessed of great virtues. In war his valour was only equalled by his clemency. An enemy to all luxury and excess, he did every thing in his power, by his authority and his example, to repress the growing extravagances and debaucheries of the times, and abolished many customs of the imperial court which he considered only occasions of expense and effeminate indulgence. Much of his time was spent in conversing with learned men, much in solitary study ; indeed, from a very early hour in the night till morning was generally devoted by him, even during his campaigns, to reading and writing. He has left several works, all written in Greek, which was then the language of the court.

In a still more recent but much darker age, we find literature cultivated with zeal by the emperor CHARLEMAGNE, when there were few other individuals to whom it was at all an object of attention throughout his vast dominions. This great conqueror, whose life was spent in almost incessant wars, was yet wont to give whatever leisure he could spare to reading, writing, and the converse of the learned ; and a considerable number of his letters and other compositions are still extant. Even when confined to bed by sickness, he was accustomed to amuse himself, we are told by his biographer and contemporary Eginhard, in attempting to imitate the elaborately ornamented characters common in the books of that age,—a statement which has been erroneously interpreted as importing that all his progress in the art of writing consisted merely in these ineffectual essays. It can scarcely be doubted, from other circumstances, that he was familiar with this art. The greatest service, however, which Charlemagne rendered to learning

was his munificent patronage of its professors, and the readiness and zeal with which he lent himself to various schemes for its restoration and diffusion. The University of Paris, as is well known, sprang from a seminary which he established in his palace (hence called the Palatine school), and in the institution of which his principal adviser and assistant was our countryman, the able and accomplished Alcuin. This school was opened about the year 780, while its projector was yet in the very midst of his wars. While letters, long forgotten both in courts and general society, were thus enjoying the protection of Charlemagne in the West, the famous Haroun Al Raschid (or the Just), whose name the 'Arabian Nights' Entertainments' have made so familiar to every reader, and whose extensive dominions entitled him to be regarded as Emperor of the East, was affording them equal encouragement in that quarter of the globe. Haroun was himself, indeed, an excellent poet, and distinguished for his proficiency in various branches of learning. But at this time the Moors were very considerably a-head of the nations of Christendom in civilization and the knowledge of the arts. The two great potentates we have mentioned, between whom so large a portion of the earth was divided, are recorded to have corresponded with each other; and in the year 807 an ambassador from the Caliph arrived in France, bringing with him various presents for Charlemagne. Among these was a clepsydra, or water-clock, which excited especial admiration, as a contrivance beyond anything which ingenuity had yet invented in Europe. Another of Haroun's presents was a set of chess-men, some of which are still preserved in the Royal Library at Paris. Charlemagne reigned from the year 768 to 814, when he died at the age of seventy-one; and Haroun Al Raschid died at the age of forty-seven in 809, after a reign of twenty-three years.

But our own ALFRED, whose extraordinary attainments in learning, made in the latter portion of a short and very busy life, we have already briefly noticed, sheds a much brighter glory over the ninth century than Charlemagne

and the Caliph Haroun do over the eighth. Alfred was born in the year 849, succeeded to the crown in 871, and his reign extended to the close of the century. Even the unusual lateness of the period at which his acquaintance with books commenced was but the least of the untoward circumstances with which this wonderful man had to contend in his pursuit of knowledge. Born, as he was, the son of a king, how scanty were the means of education of which he had it in his power to avail himself, compared with those which, in our happier days, are within the reach of the poorest peasant! In that age it demanded the price of a goodly estate to purchase a book; and in England, especially, teachers were so scarce, that Alfred, so long as he continued merely a prince dependent upon his father or his elder brothers, actually seems to have been without the requisite resources to procure their services. Nothing, as his biographer, Asser, informs us, was a more frequent subject of regret with him, than that, during the only time of his life when he had either health or leisure for study, he had thus been left utterly without the means of obtaining instruction. For as soon almost as he had passed his boyhood, he was obliged to engage in active duty as a soldier; and the incessant toils of a military life, in the course of which he is recorded to have fought no fewer than fifty battles, as well as to have undergone a succession of hardships and sufferings, under which an ordinary mind would have broken down in despair, consumed not a few of the best of his succeeding years. And even after he succeeded to the throne, when we consider that, in addition to the extensive literary labours which he accomplished, he not only attended to his multifarious public duties with a punctuality that has never been surpassed, but, notwithstanding his harassing bodily ailments, signalized himself by his prowess and dexterity in every manly exercise, we may well ask by what mysterious art did he find time for all this variety of occupation? The answer is, that he found time by never losing it. Time is the only gift or commodity of which every man who lives has just the same share. The passing day is exactly of the

same dimensions to each of us, and by no contrivance can any one of us extend its duration by so much as a minute or a second. It is not like a sum of money, which we can employ in trade, or put out to interest, and thereby add to or multiply its amount. Its amount is unalterable. We cannot "make it breed;" we cannot even keep it by us. Whether we will or no, we must spend it; and all our power over it, therefore, consists in the manner in which we spend it. Part with it we must; but we may give it either for something, or for nothing. Its mode of escaping from us, however, being very subtle and silent, we are exceedingly apt, because we do not feel it passing out of our hands like so much told coin, to forget that we are parting with it at all; and thus, from mere heedlessness, the precious possession is allowed to flow away as if it were a thing of no value. The first and principal rule, therefore, in regard to the economizing and right employment of time, is to habituate ourselves to watch it. Alfred knew this well; and we may here relate the method he adopted to measure the passing hours, in his want of those more artificial time-pieces which we possess. Having made his chaplains, as Asser in his simple narrative informs us, procure the necessary quantity of wax, he ordered six candles to be prepared, each of twelve inches long, which he had found would together burn for four and twenty hours. Having marked the inches on them, therefore, he ordered that they should be lighted in succession, and each three inches that were consumed he considered as recording the flight of an hour. "But finding," continues the historian, "that the candles burned away more quickly at one time than at another, on account of the rushing violence of the winds, which sometimes would blow night and day without intermission, through the doors and windows, the numerous chinks in the walls, or the slender covering of the tents, he be-thought him how he might prevent this inconvenience; and, having contrived artfully and wisely, he ordered that a lanthorn should be fairly fashioned of wood and horn; for white horn, when scraped thin, allows the light to pass through even like glass. The candle, there-

fore, being placed in the lanthorn, thus wonderfully constructed, as we have said, of wood and horn, was both protected from the wind, and shone during the night as luminously without as within." Every heart will acknowledge that there is something not a little interesting, and even touching, in these homely details, which paint to us so graphically the poor accommodations of every kind in the midst of which Alfred had to pursue his studies, and the humble matters with which his great mind was often obliged to occupy itself in contriving the means of gratifying its noble aspirations. This illustrious man, indeed, seems almost to have lifted himself quite above the tyranny of circumstances; realizing, in the most disadvantageous, nearly all that could be expected or desired in the most favourable. The difficulties with which he had to contend, in truth, formed the very soil out of which no small portion of his greatness grew. Among kings he is not only the Great, but the very greatest. If we look merely to his zeal and services in behalf of literature, it is impossible to name any royal personage that can be compared with him either in classic antiquity or in modern times. A genuine love for letters, and a proficiency in them, in the possessor of a throne, is worthy of our admiration, in whatever age or country the phenomenon may be recorded to have been witnessed; because it must always be considered as a striking example of a triumph over seductions that are generally, of all others, found the most difficult to resist, and have, accordingly, been of all others the most seldom resisted. But of the other learned kings of whom we read in history, some were literary in a literary age; others, naturally unfitted for the more active duties of their station, took to philosophy, or pedantry, as a refuge from insignificance; some had caught the love and the habit of study before they had mounted a throne, or had dreamed of mounting one; above all, most, if not all of them, had been carefully educated and trained to letters in their youth. But it is told only of Alfred, that, without an example to look to, without even the advantages of the very scantiest

education, in an unlearned age, and a still more unlearned country, he, who had been only a soldier from his youth upwards, withdrew himself of his own accord from the rude and merely sensual enjoyments of all his predecessors and all his contemporaries, to devote himself to intellectual pursuits, and to seek to intertwine with the martial laurels that already bound his brow the more honourable wreath of literary distinction.

Of the royal personages of our own country who have distinguished themselves by their love and cultivation of letters, the most eminent, next to Alfred, is JAMES I. of Scotland, whose poem, entitled the 'King's Quhair,' composed by him during his imprisonment in Windsor Castle, we have already mentioned. James was born in 1394, but, having been taken prisoner by the king of England in 1405, was detained in that country, mostly in close confinement, till his thirtieth year; after which, having been allowed to return to Scotland, he reigned for thirteen years, and was at last cruelly assassinated in the Carthusian monastery at Perth, on the 20th of February, 1437, by a faction of his nobles, whom his attempted reforms dissatisfied. Literature had been the principal solace of James's long imprisonment, and he brought with him to the throne the tastes which he had acquired in his exile. He certainly contributed very essentially, even during his short reign, to promote the civilization of his native country. Nothing can exceed the warmth of the admiration with which all the old historians speak of his genius and accomplishments, and of the effect which his example had in diffusing among his people that spirit of literary cultivation, and love for all elegant and intellectual accomplishments, by which he was himself distinguished. He was a proficient, we are told, in the Latin language, and, some authorities add, even in the Greek, although this last statement must be regarded as apocryphal, all things considered. His mastery over his native tongue was, at all events, his most remarkable endowment. The songs and other metrical pieces which he composed in the Scottish dialect, though

now probably all lost, are said to have long continued to be the delight of all classes of his countrymen; and to their influence we are, in all probability, to trace much of that universal sensibility to poetry which has ever since distinguished the Scottish peasantry, and which has displayed itself in the creation of a body of traditionary verse, of wonderful extent and richness. Give me, some one has said, the making of a people's ballads, and I care not who has the making of their laws. If the opinion conveyed in this remark be correct, James I. perhaps influenced the character of his countrymen quite as much as any of their legislators. Some authorities also claim for this prince the honour of being the father of the peculiar music of his country. He is recorded by our old chroniclers to have been eminently skilled both in vocal and instrumental music, and to have performed on no less than eight different instruments, of which the one on which he most excelled is stated to have been the harp. But, at any rate, from the time of James we may date the proper commencement of the literature of Scotland, to which, indeed, he seems to have also given not a little of the peculiar character that long distinguished it. His own writings, as has been stated, were poetical compositions, in the style that had been so recently introduced by Chaucer, whom, in his 'Quhair,' he expressly mentions as his master. The 'Quhair' is an elegant poem, displaying considerable descriptive talent; but the tradition respecting some of James's more popular poetical compositions is that they evinced powers of humour of the very highest order. Before his day Fordun had written his prose chronicle of Scottish kings, and Barbour his metrical work entitled 'The Bruce;' but these, notwithstanding some passages of vivid description in the latter, which certainly give its author considerable pre-eminence among the class to which he belongs, were merely such works as have been produced among every people having the use of letters, as soon as they have acquired for themselves what may be called a history; and indicate not so much that a national literature has taken root among

them, as simply that they have reached a certain antiquity, and have a past national existence to look back upon. That which alone we can properly call the authorship of Scotland commences with the works of king James, and is continued by those of Dunbar, Gavin Douglas, and Sir David Lyndsay, who may all in some sort be considered as his imitators, or at least as having, like himself, taken their inspiration from that new-born poetry of England with which he, there can be little doubt, was the first to make his countrymen acquainted.

Few kings, therefore, in spite of the failure of many of his projected political reforms, have done more for their subjects than James did for his. He regenerated them by means more powerful than any merely political contrivances, when he exhibited before them for the first time the graces and attractions of intellectual cultivation, and gradually seduced them by the charm of his example to the love of the arts and elegancies of civilized life. Laws and institutions are, after all, in themselves, but the dead skeleton of society, and can only derive their life and efficiency from the spirit breathed into them by the character and moral condition of the people. They are the body; this is the animating soul. In giving, therefore, to his countrymen the first impulses of literary refinement, he gave them something better even than good laws, because it was that which, while it would eventually enable them to secure good laws for themselves, at the same time could alone fit them for their enjoyment. His life, not less than his death, was a sacrifice to his zeal for their improvement; for, with tastes and habits that tended to separate him so completely from his subjects, his residence, even as a king, in Scotland must have been felt by him as far more truly exile than even his previous imprisonment. Yet we have no reason to think that, although his days were spent first in durance abroad, and then in worse than durance at home, he ever indulged in any weak or undutiful murmuring at his fate. On the contrary, we gather from all that is related of him, that, during the short period of his life when he was permitted to mix with the world,

he showed himself of a cheerful and even joyous spirit, and found the means of making himself happy even in the midst of the hardest fortune that was dealt out to him. With his intellectual endowments and his love of letters, he had sources of happiness which few in his station have ever enjoyed, and these were blessings which the vicissitudes of outward fortune had but little power to affect.

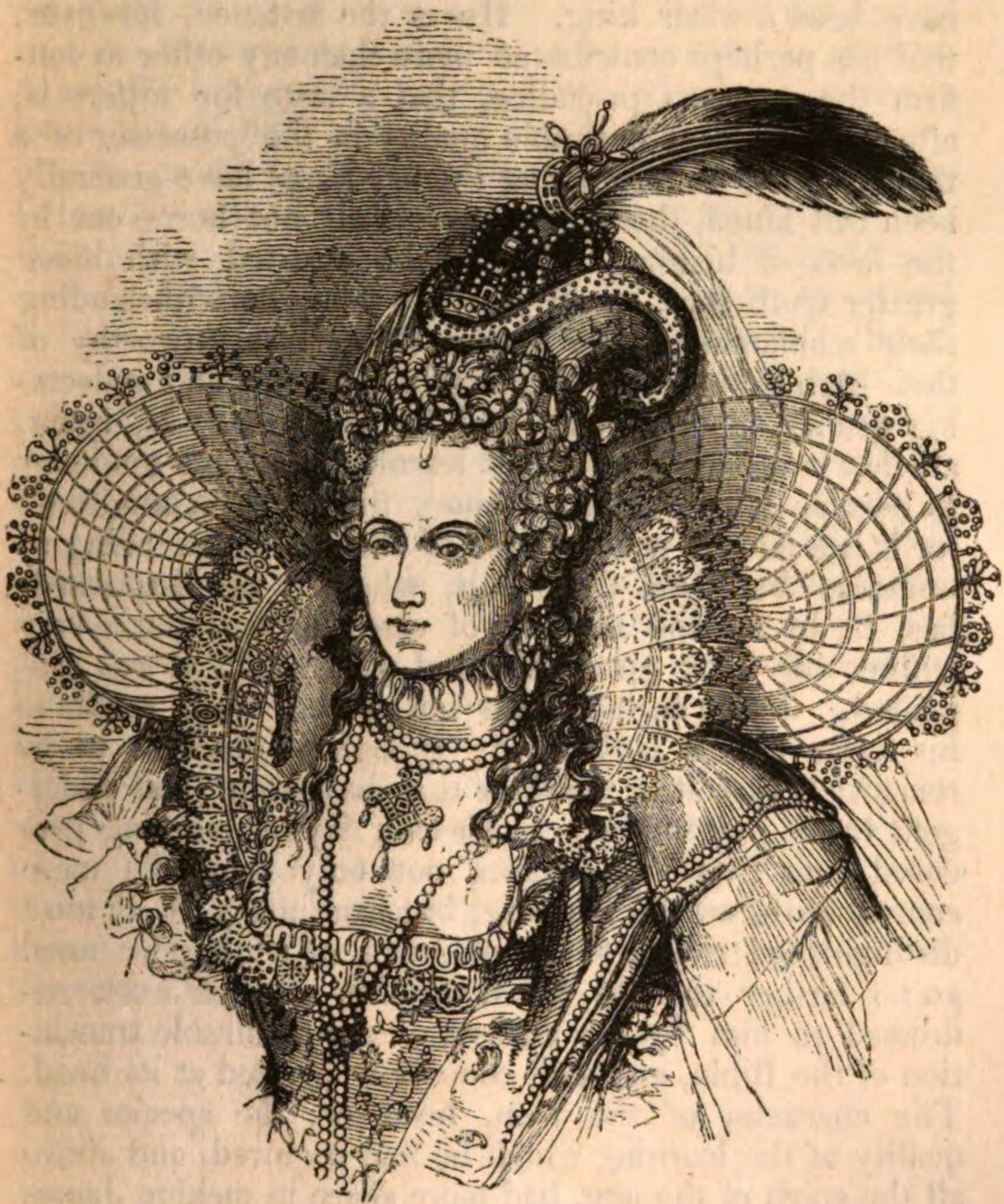
We might add several names to the list of learned kings, even from the monarchs of our own country. HENRY I., in the early part of the twelfth century, obtained the surname of *Beauclerc*, or the Learned, from his proficiency in the literature of the times. During the sixteenth century, classical and theological erudition was so much in fashion, that persons of the very highest rank, and of both sexes, very generally received what is called a learned education. It is related of the emperor Charles V., that, having been upon one occasion addressed by an ambassador in a Latin oration, he was so much affected at finding himself unable perfectly to follow the speaker, that he publicly reproached himself for his inattention, when a boy, to the instructions of his tutor,* who, he remarked, had often warned him, that a day would come when he would regret his negligence. So universally in those days was this sort of learning expected in crowned heads. Accordingly we find almost all our sovereigns of that age proficient in the ancient languages, and adepts in polemical divinity. Henry VIII. disputed, through the press, with Luther, in Latin. His son, Edward VI., had he lived, would probably have given proofs of still greater accomplishments in the same department of scholarship. One of his tutors was Sir John Cheke, of whom Milton speaks, in a well-known sonnet, as having taught “Cambridge, and King Edward, Greek;” and it is a curious illustration of the times, that this learned individual was soon after selected to fill the office of Secretary of State. Queen ELIZA-

* The same who afterwards became Pope, under the title of Adrian VI.—See *ante*, p. 9.

BETH, we need hardly remark, is famous as a learned princess. She also, like her royal predecessor, King Alfred, completed an English translation of Boethius's 'Consolations of Philosophy'—a work which, in addition to having been thus rendered into the vernacular tongue by two of the greatest of our monarchs, had the honour of



Edward VI.



Elizabeth.

receiving the same service from Chaucer, the father of our poetry.* Elizabeth's successor, JAMES, had more learning than good sense, and was a pedant rather than a scholar; but, with less learning, he certainly would not

* The original copy of Queen Elizabeth's translation of Boethius, partly in her majesty's hand-writing, and partly in that of her secretary, was discovered, a few years ago, in the State Paper Office.

have been a wiser king. He is the instance, however, that has perhaps contributed more than any other to confirm the common prejudice, that a taste for letters is, after all, no very desirable quality in the possessor of a throne. If it be meant that literary kings have generally been bad kings, the notion is certainly not borne out by the facts of history. It may be asserted with much greater truth that, in all of those who, notwithstanding their scholarship, have shown themselves unworthy of their high station, that scholarship has yet been a redeeming quality, both in itself, and in its effects. If, again, all that is meant be only that learning has some tendency to become pedantic on a throne, this may be admitted; for it is a natural consequence of the possession being so unusual: but even this result, where it has happened, has, in by far the majority of cases, formed but a very trifling drawback upon the good with which it was connected. James certainly has not gained much credit to his name by his authorship; though it deserves to be remarked, that it is posterity that has been least indulgent to his pretensions. In his own day his learning procured him great admiration, not only from the mere courtly flatterers of the time, but from many of its most distinguished scholars—for evidence of which, we need go no farther than to the dedication of their work addressed to him by the authors of our admirable translation of the Bible, and still commonly printed at its head. The character of the man, however, the species and quality of the learning which he had acquired, and above all the spirit of the age, had more share in making James the pedant that he was than any disadvantage under which his station placed him.

Another name, which is sometimes quoted as that of a king to whom learning was a misfortune rather than a blessing, is that of the celebrated ALPHONSO X., king of Castile and Leon, commonly called the *Wise*. This prince, who lived in the thirteenth century, was certainly unlucky in his schemes of political ambition; and the vain attempt he made to obtain possession of the imperial crown involved him in a series of calamities, and even-

tually led to his dethronement. But it does not appear that his literary and scientific acquirements, so extraordinary for his age, had anything to do in occasioning the errors to which he owed his ruin, or that, with less learning, he would have been either more prudent, or more fortunate. As it was, Alphonso, notwithstanding the troubles in which his reign was passed, conferred such services, both upon his own country and upon the world at large, as few royal names have to boast of. Spain owes to him, not only her earliest national history and translation of the Scriptures, but the restoration of her principal university, the introduction of the vernacular tongue in public proceedings and documents, and the promulgation of an admirable code of laws; and science is indebted to this monarch for the celebrated astronomical tables known by his names, the earliest which were compiled subsequently to those given in the *Almagest* of Ptolemy, who flourished in the second century. According to some accounts, Alphonso spent the large sum of 400,000 crowns on the preparation of these tables, in which he was assisted by others of the most learned astronomers of the time. They went through several editions, even after the invention of printing, and continued, indeed, to be generally used by astronomers till the commencement of the sixteenth century.

CHAPTER XXV.

Peter the Great (Czar of Russia).

BUT the pursuit of knowledge is not necessarily confined to the study of books ; and, therefore, although we pass over many other names that might be here introduced, we must not omit that of a sovereign who distinguished himself by his ardour in this pursuit in a variety of ways, and was in all respects one of the most extraordinary men that ever lived,—the Czar PETER I. of Russia. Peter was born in 1672, and at ten years of age found himself in nominal possession of the throne ; although, for some time, all the actual power of the state remained in the hands of his sister, the princess Sophia, who was about five years older than himself. But his boyhood was scarcely expired, when he gave proof of the energy of his character by ridding himself of this domination ; and in 1689 the princess was already removed from the government, and immured in a monastery. From this moment the young czar, now absolute in reality as well as in name, directed his whole efforts to the most extraordinary enterprise in which a sovereign ever engaged ; being nothing less than to change entirely the most settled habits and prejudices of his subjects, and not so much to reform them, as to transform them, almost by main force, from barbarians into a civilized people. For the Russians at this time—not more than a century and a half ago—were, in truth, little better than a nation of savages. Nay, Peter himself was born and reared a savage ; and to his last days the passions and propensities of his original condition remained strong in his nature. It speaks the more for his wonderful genius that, throughout his whole history, he forces us to feel that we are reading the ad-

ventures of the chief of a barbarous country, struggling to civilize himself as well as his people. And undoubtedly we do not follow his progress with the less interest on that account. Nothing, in fact, in his proceedings or his character so much engages our curiosity, as to watch the astonishment with which his own ignorance was struck on the first view of those arts of civilized life which he was so anxious to introduce among his less ambitious, but hardly more ignorant, subjects. It is exactly the case of a strong-minded and enterprising leader of some tribe of wild Americans or South Sea islanders, setting out to see with his own eyes the wonders of those distant lands of which his white visitors have told him, and, after all, viewing the scenes which civilization presents to him with an intoxication of surprise, which shows how imperfectly even his excited fancy had anticipated their actual nature. But, however he was at first struck with what he beheld, Peter did not continue long lost in mere amazement. The story which is told of the occasion which awakened him to the ambition of creating a Russian navy is very illustrative of his character. While looking about one day among some old stores and other neglected effects, he chanced to cast his eye upon the hulk of a small English sloop, with its sailing tackle, lying among the rest of the lumber, and fast going to decay. This vessel had been imported many years before by his father, Alexis Michelovitch, also a prince of distinguished talents, and who had nourished many schemes for the regeneration of his country; but it had long been forgotten by everybody, as well as the object which it was designed to promote. No sooner, however, was it observed by Peter than it fixed his attention; he made inquiries of some of the foreigners by whom he was surrounded as to the use of the mast and sails, even the general purposes of which he did not know; and the explanations which he received made him look on the old hulk with new interest. It immediately became, in his imagination, the germ of a magnificent national marine; and he could take no rest till he had made arrangements for having it re-

paired and set afloat. With some difficulty the Dutch pilot was found out whom Alexis had procured at the same time with the sloop to teach his subjects the method of managing it; the man, like the vessel, of which he was to have the charge, had long been forgotten by all the world. Once more, however, brought out of his obscurity, he soon refitted the sloop; and the Czar was gratified beyond measure by at length beholding it, with its mast replaced and its sails in order, moving on its proper element. Delighted as he was, he went himself on board, and was not long before he became a sufficiently expert seaman to take the place of his Dutch pilot. For several years after this his chief attention was given to maritime affairs; although his first ships were all of foreign construction, and it was a considerable time before any issued from his own docks. From so small a beginning as has been described, Russia has since become, after England, one of the greatest naval powers in the world.*

* The most detailed account we have met with of the story told in the text is one preserved among the MSS. of Sir Hans Sloane, in the British Museum (No. 3,168). It appears to have been written shortly after the death of Peter the Great, and by a person who was either a native of Russia or had resided in that country. According to this authority the incident took place in the flax-yard at Ishmaeloff, an old seat of the royal family near Moscow. The writer gives us also an account of a great naval show, at which he himself was present, in honour of this celebrated vessel, which took place by the emperor's command at St. Petersburg, on the 12th of August, 1723. On this occasion the sloop, or ship's boat, as it is here called, having been repaired and beautified, was received by about 200 yachts, and, having advanced to the harbour attended by that numerous convoy, was then saluted by a general volley from the twenty-two men-of-war, which might be considered as forming its progeny. The emperor, of course, was present, and the day was altogether one of the greatest festivals that had been known in Petersburg. "A few days after," it is added, "the boat was brought to Petersburg, and laid up in the castle, where she is to be taken the greatest care of."

But the most extraordinary of the plans which Peter adopted in order to obtain an acquaintance with the arts of civilized life, was that which he put in execution in 1697, when he set out in the suite of his own ambassador to visit the other countries of Europe. On this occasion, passing through Prussia, he directed his course to Holland, and at last arrived at the city of Amsterdam. His embassy was here received by the government of the United Provinces with all manner of honour and distinction; but he himself refused to be recognized in any other character than that of a private individual. The first days of his visit were spent in perambulating the different streets of the city, the various wonders of which were probably never viewed by any eye with more astonishment and gratification than they excited in this illustrious stranger. The whole scene was nearly as new to him, and as much beyond anything by which he had ever before been surrounded, as if he had come from another world. The different arts and trades which he saw exercised, and the productions of which met him, wherever he turned, in such surprising profusion, were all attentively examined. But what especially attracted his attention was the great East India dockyard in the village of Saardam (situated a few miles from Amsterdam), which was then the principal establishment of this description in Holland. Here he actually took the singular resolution of entering himself as a working carpenter; and accordingly, giving in to the superintendent the simple name of *Peter Michaelof**, he took his place among the

* That is, Peter the grandson of Michael, according to the manner of forming the surname in Russia among the lower orders. His majesty's proper designation was Peter Alexovitch, or the son of Alexis. *Of*, or *ow*, as it is pronounced, and often written, seems to be the same with the Celtic *O*, still used as a prefix to proper names in Ireland, and the Scottish *oe* or *oy*, which generally signifies a grandchild, but, in some districts, a nephew, having been applied originally, in all probability, to any near descendant, direct or collateral. *Vitch*, again, is the Norman, or old French, *Fitz*, now *Fils*, a son.

other workmen, and became in all respects one of them, even wearing the same dress, eating the same sort of food, and inhabiting equally humble lodgings. The hut in which he lived is still shown at Saardam. When he first made his appearance in the dockyard nobody knew who he was, and he of course attracted no notice; but, even after his true quality was discovered, he would suffer none of the observances usual to persons of his rank to be paid to him, repelling every attempt of the kind with evident displeasure. And in this way of life he passed several months, during which time he bore a considerable part in the building of a vessel, which, when completed, was named the *St. Peter*, and was purchased by the royal person whose hands had thus helped to put its timbers together. While thus employed, however, the Czar did not neglect his duties and appropriate occupations as a sovereign. After the labours of the day were over, his evenings were generally employed either in writing dispatches to the ministers whom he had left in charge of affairs at home; or in holding consultations with his ambassador regarding the negociation pending with the Dutch government, in which he took the most anxious interest, as having for its object the procuring of a supply of vessels and seamen from that power to aid his favourite scheme of forming a navy for Russia. In this application, however, he was unsuccessful.

On leaving Holland, Peter proceeded to England in a vessel sent to convey him by the government; but on his arrival in London he insisted upon still being treated only as a private individual. Here he spent his time at first as he had done in Holland, examining the many interesting objects that everywhere met his view. Among other places he went to see the Tower, where he was much delighted with the armoury, and the coining of money in the Mint. He was taken also to see the two houses of Parliament when sitting; and he appeared twice or thrice at the play, but did not seem to have much relish for that species of amusement. He was very fond, however, of visiting the churches; and was so anxious to learn the mode of worship observed by the

different denominations of dissenters, that he attended several of their chapels. On one occasion he was present at a Quakers' meeting. He paid one visit to Oxford, to see the University; and another to Portsmouth, where he was greatly entertained by [a mock sea-fight that was exhibited to him. On this occasion he declared that he considered an English admiral a happier man than a Czar of Muscovy.* He also applied himself with zeal and diligence to learn whatever he deemed useful, without regarding the humble nature of any of the handicrafts in which he wished to become a proficient. With these views he did not scruple to work as a common labourer in paper-mills, saw-mills, rope-yards, and other establishments of a similar kind. Voltaire mentions (*Histoire de Russie*, i. 159), that he studied with particular attention the art of watchmaking. His first residence was a house appointed for his reception by government below York-buildings, in the neighbourhood of Westminster-bridge; but he found this both a very noisy place of abode and not conveniently situated for the object on account of which principally he had come to England,—his improvement in the art of ship-building. After a short time therefore, he removed to Deptford; and here he spent several months in the dockyard, employing himself in the same manner as he had done in that of Saardam. He was so much pleased, it is said, with the superior method of working which he found pursued here, that he used to declare he never should have known his trade had he not come to England. While at Deptford he lodged in the house of the celebrated John Evelyn, author of the 'Sylva,' which stood on the site now occupied by the Workhouse of the parish of St. Nicholas. We find the circumstance noticed in Evelyn's Diary under the date of 30th January, 1698: "The Czar of Muscovy being come to England, and having a mind to see the building of ships, hired my house at Say's court, and made it his court and palace, new furnished for him by the king." He remained here; it

* Mottley's Life of Peter the Great.

appears, till the 21st of April. Some notion of his manner of living may be obtained from a letter written during this time to Evelyn by his servant: "There is a house full of people, and right nasty. The Czar lies next your library, and dines in the parlour next your study. He dines at 10 o'clock and 6 at night, is very seldom at home a whole day, very often in the king's yard or by water, dressed in several dresses. The king is expected there this day; the best parlour is pretty clean for him to be entertained in. The king pays for all he has."*

While the dockyard, however, was the place in which the Czar spent the greater part of the day, he employed many of his leisure hours in taking lessons in mathematics, navigation, and even anatomy, which he had begun to study while in Holland under the instruction of the eminent professor Federick Ruysch, whose museum he afterwards purchased for the sum of thirty thousand florins. Peter, indeed, neglected no opportunity during his travels, of forming the acquaintance of distinguished individuals; and both in Holland and England many of the ablest men of the time were introduced to him, some of whom he persuaded to accompany him home to Russia. He also expended considerable sums in purchasing such curious productions of art as he conceived might best excite the emulation of his subjects.

Among other persons who were made known to him when in England, was Bishop Burnet, who does not seem, however, to have comprehended the character of the extraordinary man with whom he was on this occasion brought into contact. In the History of his own Times he tells us the impression the Czar made upon him. "He wants not capacity," says he, "and has a larger measure of knowledge than might be expected from his education, which was very indifferent;" but immediately after he adds that he "seems designed by nature rather to be a ship-carpenter than a prince." He did not at that time appear to the bishop to be capable of conducting so great a design as the attack upon the

* Bray's Memoirs of Evelyn, ii. 60.

Turkish empire, which he was understood to be meditating; although it is acknowledged that he afterwards displayed a greater genius for warlike operations than the writer then imagined him to possess. Bishop Burnet had a good deal of conversation with him upon religious matters, and remarks that "he was desirous to understand our doctrine, but he did not seem disposed to mend matters in Muscovy." He allows, however, that he was "resolved to encourage learning, and to polish his people by sending some of them to travel in other countries, and to draw strangers to come and live among them." The learned prelate concludes his account by the following curious reflection: "After I had seen him often, and had conversed much with him, I could not but adore the depth of the providence of God that had raised up such a furious man to so absolute an authority over so great a part of the world."

We cannot here enter into any detail of the various reforms in the customs of his people, which this extraordinary man proceeded to introduce on his return to his own dominions, with the view of assimilating them more to those which he had found prevailing in the other countries of Europe. Suffice it to say, that, by a series of the most energetic and frequently violent measures, he succeeded in effecting a complete change in some of the oldest institutions of his empire, and even commenced a revolution in the habits and manners of general society, which, from that beginning, has since gone on till it has established, in what was before almost a barbarous country, all the benefits of a flourishing civilization. Peter may be said, indeed, to have given to his subjects nearly every art of civilized life of which they were some time afterwards found in possession. He taught them navigation, commerce, and even agriculture and the management of flocks, having imported from Saxony and Silesia both herds of sheep and shepherds to take care of them. He called to him artists of all descriptions from other countries, and employed them in contriving, each in his appropriate department, how best to bring into development the natural resources of the country. He built a

new capital, the first truly European city that had been seen in Russia, on a site which did not form part of the empire at his accession. Finally, he founded schools, academies, colleges, libraries, and museums, and thus laid the surest of all foundations for the permanent and progressive improvement of his people.

A college of physicians, a dispensary, an observatory, and a botanical garden, were among the establishments with which he adorned his two capitals.* The art of printing had been introduced into Russia about the middle of the sixteenth century; but this early press seems to have hardly left any trace of its operations, and Peter, at his accession, found his country without books. To supply this deficiency, he had some scientific works translated into Russian; and, when he was in Amsterdam, he employed a printer of that city to print them, giving him a monopoly for the sale of them in Russia. His majesty himself, some time after this, remodelled the alphabet of his native language, considerably simplifying the forms of the characters, and established several printing-houses in Petersburg, at which various elementary works were thrown off, mostly translated from foreign tongues. From this beginning the literature of Russia has so much increased, that in M. Sopikof's *Essai de Bibliographie Russe*, no fewer than thirteen thousand two hundred and forty-nine works are enumerated as having appeared in the native language up to the year 1813. In the three years from 1822 to 1824 inclusive, there appeared two hundred and seventy-five translations from French, German, English, Greek, Latin, Italian, Slavonic, Dutch, Danish, and Armenian, and five hundred and fifty-eight original works; in all eight hundred and thirty-three publications, besides works in foreign languages.†

In 1717, the Czar set out on a second foreign tour, attended on this occasion as became his rank. In the

* *Eloge de Pierre le Grand*, par Fontenelle.

† These particulars are extracted from the *Aperçu sur la Littérature Russe*, at the end of M. Balbi's *Introduction à l'Atlas Ethnographique*.

course of his progress he visited successively Hamburgh, Berlin, Amsterdam, and Paris; in the last of which cities especially he found all that the arts had yet contrived for the use and enjoyment of man in the highest state of advancement. He no longer now applied his hand to the practice of the different crafts which he inspected; his days of apprenticeship were over; but he was not on that account less diligent in visiting every workshop and manufactory in which anything novel or curious was to be seen. He went also to see the observatory, the libraries, and the different learned institutions; and was present at a sitting of the Academy of Sciences, which admitted him one of its members.

This great man's education in his youth had been worse than neglected. His sister and her counsellors had even surrounded him with every seduction most calculated to deprave both his moral and intellectual nature, and to stifle in him the desire of knowledge. The bad parts of his character were undoubtedly, in a great measure, the result of the manner in which he was treated at this time of his life. Yet, violent and ungovernable as his passions continued to be, in some respects, to the last, making him act often with a ferocity unsurpassed by anything that is told of the excesses of infuriated savages, he succeeded in completely overcoming that one of his evil habits which he found would have interfered most with the conduct of his great schemes. In his youth he was a slave to the love of ardent spirits, but he had weaned himself entirely, in his maturer days, from that destructive vice; nor was he insensible to the other defects of his original character which he had failed to correct. "Alas!" he would sometimes exclaim, on recovering from one of those paroxysms of rage by which he was liable to be carried away, "I have reformed my people, but have not been able to reform myself." Perhaps, however, no man in any station ever did more than this illustrious monarch to repair the mischievous consequences of a neglected youth, as far as intellectual acquirements are concerned. In addition to a competent knowledge of mathematics

mechanics, navigation, medicine, and anatomy, he appears to have made himself master of more than one of the modern languages of Europe. He translated several works from the French, the manuscripts of which are still preserved at Petersburg. He had even made himself familiar with the Latin tongue, if we are to believe one anecdote told by M. Stählin,* of his detection, upon one occasion, of the inaccuracies of a monk whom he had employed to translate a work written in that language into Russian. But as the original of the work in question (Puffendorff's Introduction to the History of Europe) is in fact not in Latin, but in German, it is probable that it was by his acquaintance with the latter tongue, or with the French, into which the book had also been translated, that Peter was enabled to discover the defects of the Russian version. M. Stählin tells another anecdote, which shows how fully his majesty understood the value of that early instruction which he had not himself enjoyed. Finding two of his daughters one day reading a French author, he desired one of them to translate the passage before her into Russian,—when, struck with the facility with which the task was performed, he exclaimed, “Ah, my children, how happy are you, who are thus taught to read in your youth, and enjoy all the advantages of an education which I totally wanted.” He used often to say that he would willingly have lost one of his fingers to have had a good education in his youth.

When he began at last to educate himself he did not neglect even the more elegant and ornamental acquirements. During his first visit to Holland, he had an opportunity of seeing many good pictures; and this gave him a taste for painting, to which he was ever afterwards much devoted. Even while at Amsterdam, many of his hours were spent in the working-rooms of the eminent artists who then resided in that city, some of whom he engaged to accompany him to Russia. He afterwards expended very considerable sums in the purchase both of pictures

* Original Anecdotes of Peter the Great; London, 1788.

and sculptures; and commenced the formation of a gallery of these works of art at Petersburg. He also formed a valuable collection of medals. Every department of liberal knowledge, indeed, found in Peter a munificent patron, and, so far as his leisure and opportunities permitted, even an ardent cultivator. When passing through any country interesting from its historical recollections, were he even conducting his army on a warlike expedition, he would go many miles out of his way to examine a celebrated ruin, or to tread a spot that fame had consecrated. In the same spirit, he was especially solicitous for the preservation of the old historic memorials of his own country. While travelling, his constant habit was to obtain as much information as he could beforehand with regard to every place he was about to visit; and, even when he approached the smallest village, he would inquire if it contained anything remarkable. If those about him told him it did not, he would reply "Who knows? If it be not so to you, perhaps it is to me; let me see all." When setting out on his investigations, on such occasions, he carried his tablets in his hand; and whatever he deemed worthy of remembrance was carefully noted down. He would often even leave his carriage, if he saw the country people at work by the way side as he passed along, and not only enter into conversation with them on agricultural affairs, but accompany them to their houses, examine their furniture, and take drawings of their implements of husbandry.* He obtained in this manner much minute and correct knowledge, which he could scarcely have acquired by other means, and which he afterwards turned to admirable profit in the improvement of his own country.

M. Stählin, whose notices are in general well authenticated, and may be depended on, except where it is likely that his authority was deceived, relates some curious anecdotes in illustration of the Czar's predilection for operations in surgery, which show at least that he

* Stählin's Anecdotes.

had made no inconsiderable proficiency in the art. He was rarely absent when a dissection took place in Petersburg; and occasionally he assisted as one of the operators. He let blood and extracted teeth with great expertness; and he is recorded to have once tapped a patient for dropsy. These may not seem the most appropriate accomplishments for a king; but we must remember the peculiar circumstances of Russia during the reign of this great author of her civilization. On the one hand, the simplicity of the national manners was such that it was not held at all indecorous for the emperor to mix in the domestic circles of his subjects, almost as one of themselves; and, on the other, the prejudices of the people were so strong, and their aversion to innovation so bigoted, that probably nothing less than the actual example of their sovereign would have roused them to take any interest in the new arts he wished to introduce among them. Peter, therefore, rightly felt that the consideration of the undignified nature of some of the occupations in which he engaged was far more than overbalanced by the advantages that his personal exertions gave him in overcoming the inertness, and positive opposition, on the part of his countrymen which his reforms had to encounter.

This must be his apology also (if the case shall be thought to require any) for certain other labours to which he was sometimes wont to apply his hand. He once passed a month, M. Stählin tells us, at Müller's iron-works at Istia, about seventy miles from Moscow, during which time he employed himself in learning the business of a blacksmith; and so much progress did he make, that on one of the last days of his stay he forged, with his own hand, 720 pounds of iron, making his mark on each bar. On his return to Moscow he proceeded to Müller's house, and, having received from that gentleman the same pay for his labour which would have been allowed to any other workman, about two shillings of our money, he immediately went and purchased a pair of shoes with it, which he ever afterwards took great pleasure in showing. One of the bars he forged on this

occasion is still to be seen at Istia. He was also accustomed, according to Voltaire,* to take his place sometimes among the men employed in cutting canals, a species of public labour on which he expended large sums, in order to encourage and animate them in the more difficult part of their work. But his favourite art was that of ship-building, his lessons in which, learned in Holland and England, he took care not to forget on his return home. The writer of the manuscript narrative in the British Museum, to which we have referred in a note on a former page, gives us some curious information in relation to this matter. The Czar, he tells us, as soon as he got back from England, went down to Veronez, whither he carried two English builders, named Dean and Noy, whom he had brought out with him. Of these, however, "the first," the narrative continues, "soon after desired a discharge, which was granted, without giving any proof of his art. The Czar himself and Joseph Noy received orders from the Lord High Admiral, Theodore, Alexowitz Golovin, to build each of them a man-of-war. The Czar, having taken upon himself the title of a master ship-builder, was pleased to subject himself to the condition of that character; and, in compliance with that order, gave the first proof of his skill in the art which he had learned abroad; and continued afterwards to bear that title, and had, at all times, notwithstanding his great engagements in many other affairs, one ship upon the stocks; and at his death left one ship half built, one of the largest in Europe, 180 feet long upon the deck, 51 broad, and 21 deep, and mounts 110 guns, and is by relation one of the finest bodies that has ever been seen; as were, indeed, all the rest he built. He himself drew the draught of this great ship at Riga, where was no master ship-builder but himself; and, when he returned to Petersburg, he gave the surveyor an account that he had drawn his draught of the great ship which he had orders to build from the surveyor's office, and, according to the regulations of the navy, presented his draught to be examined."

* *Histoire de Russie*, ii. 186.

The emperor, this writer adds, collected the results of his experience and reading upon the subject of ship-building, and formed them into a regular treatise on the art. This work, however, has not been published, although it is probably preserved, with the other literary productions of the writer, in the Imperial Library at Petersburg. The only work from the hand of Peter the Great which has been printed, is his Journal from 1698 to the peace of Neustadt in 1721. Of this document, which is almost entirely occupied with military transactions, a French translation by M. Formey was published at Berlin in 1773, in one volume, quarto.

Peter died in 1725, in the fifty-third year of his age. His history presents us with, perhaps, as remarkable a case of the conquest of difficulties in the pursuit of knowledge as it would be possible to quote. In his noble resolution to educate not only himself but his country,



Buonaparte.

he had to contend with obstacles at every step, which nothing could have overcome but that determination to succeed which overcomes all things. Few monarchs

have better deserved the epithet of Great, if he is to be appreciated either by the great powers of mind he displayed, or the great effects he accomplished. And of these last it is to be remarked that none have passed away ; all have been permanent and productive. Compare Peter the Great, in this respect with many other characters who during their time have filled the earth with the noise of their exploits ; and how high must he be placed above them ! Alexander's mighty empire fell to pieces as soon as his own hand had resigned its sceptre ; so did that of Charlemagne ; so did that of Buonaparte. These all, after moving everything, established almost nothing.* But whatever the Russian planted still grows and flourishes, and bears fruit more plentifully every year. The reason is, that, while other builders up of empires have trusted, for the support of their institutions, alone or chiefly to the sword, he based his on the moral strength of knowledge and civilization.

* The Code of Laws, called after his name, is the only permanent monument of his power which Napoleon has left in France. Where he applied his ability to the real advancement of civilization, the traces of his career were not to be effaced by changes of rulers or of opinions.

CHAPTER XXVI.

Advantages of Wealth in the pursuit of Knowledge—Napier.

NOTWITHSTANDING the honourable reputation which the princes we have named, and others whom we have not room to notice, have acquired by their devotion to intellectual pursuits, it must be admitted that science and literature have been much more indebted to the example and patronage, than to the actual performances, of the royal personages who are to be counted among their friends. No great discovery or immortal composition claims a king as its author. When the genius that might have accomplished such has been found on a throne, it has been otherwise occupied than with the quiet but divine pleasures of learning and philosophy. And doubtless this is only as it should be. Men have not crowns put upon their heads that they may write books or spend their lives in constructing philosophical theories. Every station has its peculiar duties, which must first be attended to, even before the pursuit of knowledge; and those of sovereigns are sufficiently arduous to make it impossible, when they are fully performed, that this pursuit can be anything more than the avocation of their leisure. To this extent only, therefore, it is desirable that they should devote themselves to it. But, if so, it cannot be expected that this class of persons should contribute many, or even any, names of first-rate distinction to the history of literature or science. It were not fitting, indeed, that the same individual should have supremacy at once in two worlds so entirely different and unconnected as that of political dignity and that of genius. All, therefore, we repeat, that philosophy and the arts usually have to ask of kings is, their protection and countenance, and an example which may at least evidence an attachment to

intellectual pursuits, even while duties of another sort demand the chief attention. Whether letters, generally speaking, flourish best with or without the patronage of courts, we do not here stop to inquire. It is at all events certain, that in some cases the literary progress of a country has been greatly indebted to a love of literature in its sovereign. Thus it was that Alfred imported civilization into England, James I. into Scotland, and Peter the Great into Russia.

But other individuals in possession of wealth or rank are differently situated from kings. They have often no public duties to perform, or none from which they may not disengage themselves, in so far at least as they would interfere with the closest application to intellectual pursuits. In most countries, indeed, they are not called upon to take a part in the management of affairs, in ordinary circumstances, by any need that the state has of their services so much as by their own ambition for political distinction ; and so numerous are almost always the competitors here, that an individual who chooses to withdraw from the throng will rarely have cause to reproach himself with having deserted a post which there are not a hundred others ready, and as well qualified, to occupy. However, we would neither condemn nor depreciate any path of honourable enterprise ; doubtless it is the duty of every man, who believes that he can most benefit his country by his political services, to endeavour to do so. But this is at least an ambition by which many are apt to be seduced, who look rather to its glittering prizes than to their own qualifications ; and it is also undeniably one in which something else than merit often contributes to success. There can be no danger therefore of too many persons deserting politics for philosophy. There will always be a sufficient number of our men of wealth and rank to serve the state, and contend for her honours and her offices, although as many leave the crowd as the love of study and speculation can possibly withdraw.

But political ambition, in truth, is not that seduction by which persons of this description are most apt to be enthralled. The besetting temptations attendant upon

the possession of wealth and leisure (which, rightly employed, constitute such inestimable advantages) are the facilities which they afford to the indulgence of mere indolence and love of pleasure. A rich man, who can live without exertion of any kind, is apt to lose the power even of that degree of exertion which is necessary for the acquisition of knowledge. Besides, his money provides him with other enjoyments; and he often never even acquires a taste for those of an intellectual kind. A defective or misdirected education too frequently only prepares him the better for yielding to the unfortunate influences of his condition; and the habits and prejudices of society come also to assist their force and confirm their dominion. When an individual thus circumstanced, therefore, betakes himself in good earnest to the pursuit of knowledge, he also is entitled to be regarded as one who has exhibited much energy of character, and conquered many difficulties, as well as he who has had to struggle with poverty, or an uncongenial occupation, in his attempts to obtain an acquaintance with books. The impediments which have lain in the way of the former are different from those that have beset the path of the latter; but they may not have been less difficult to overcome. The fact, at all events, is, that the temptations of wealth have often exerted as fatal an effect in repressing all ardour for intellectual pursuits as ever did the obstructions of indigence.

Yet, where the love of knowledge has taken full possession of the heart, the rich man is in a much more favourable situation than the poor man for the prosecution of great enterprises in science or literature. Those demand both leisure and ease of mind—two good things, of the first of which generally but little, and of the second often not much, are his who has to provide for his daily bread by his daily labour. Hence some of the greatest names, in all departments of philosophy and learning, are those of persons who, unembarrassed by the toils and cares of obtaining a subsistence, have been free to lead a life of contemplation, having purchased to themselves that inestimable privilege by a relinquishment

of the other pleasures or objects of ambition ordinarily followed by those in their situation, and seeking no other advantage from their riches or their competence than that of being at liberty to devote their time and their powers of mind to labours of their own choosing. From the list of the illustrious of ancient times, we need mention no others, and we can mention no greater, than Plato and Archimedes—both of whom were of distinguished birth (the former being a descendant of the family of Solon, the other a near relation of King Hiero), and, there is every reason to suppose, opulent. But we pass from times so remote, that, even when the circumstances of the case are well ascertained, the changes that have taken place in everything detract from the value of an example or illustration, in order to notice two or three of the more remarkable instances which belong to a state of society more nearly resembling our own.

The first name we shall mention is that of JOHN NAPIER—often, but erroneously, called Lord Napier. He was not a nobleman, but only what would in England be called a lord of a manor. Such persons in Scotland were formerly designated *barones minores*, or *lesser barons*; and to this class the baron of Bradwardine belonged as well as Napier, who in like manner was baron of Marchistown, or Merchiston,* an old seat of the family in the neighbourhood of Edinburgh. Here, or, according to other authorities, at Gartness in Stirlingshire (an estate which also belonged to the family), Napier was born, in the year 1550, at which time his father, who lived for fifty-eight years after this, could not have been older than sixteen. In 1562

* Thus, on the title-page of his ‘*Mirifici Logarithmorum Canonis Descriptio*,’ (Edin. 1614,) he calls himself ‘*Baro Merchistonii*.’ He was not, on this account, however, either “the Lord Marchiston,” as he is described by Lilly the astrologer, or “the Lord Napier,” as he has been called by others. He was merely *laird* of Merchiston; a title which, although of course etymologically identical with the English *lord*, is applied in Scotland to any landed proprietor.

he entered St. Salvator's college, St. Andrew's, as appears by the books of the university.* At this time, of course, he was only twelve years old; but this was not an unusually early age in those days for going to the university in Scotland. Many entered even younger; and in the university of Glasgow it was found necessary to make a law that no student should be admitted to the degree of bachelor of arts before the age of fifteen, unless upon good reason appearing to dispense with a year in any particular case. Napier's own language, therefore, is not inappropriate, when, in his treatise on the Apocalypse, published in 1593, he tells us that it is "no few years" since he began to "precogitate the same," being then, as he adds, in his "tender years and barneage (childhood) at St. Androes, at the schools."

On leaving college, Napier is understood to have set out on his travels, in the course of which he visited France, Italy, and Germany. It is not known when he returned home; but he was probably a considerable time abroad, since we hear little more of him till he was above forty years of age. On arriving again in his own country, although he had already acquired considerable reputation for abilities and learning, and might probably have entered upon a political career with many advantages, he declined entering into public affairs, and retired to Merchiston, with the intention of devoting himself exclusively to study. A room in which he used to seclude himself for this purpose, at the top of the old tower of Merchiston, is still shown. He also resided occasionally at Gartness, where he was looked upon by the common people, we are told, as a wizard—a common fate of learned and studious men, down even to an age so recent as this, although Napier's is probably one of

* Lord Buchan, in his *Life of Napier* (Edinb. 1788), conjectures that he did not go to college till 1566: and observes that the records of the university do not ascend higher than the beginning of the seventeenth century. The fact is that they reach to the year 1413, when the university was opened.

the latest names that acquired this species of celebrity. As an evidence that his renown for more than mortal knowledge was not confined to the simple peasantry of Stirlingshire, we may mention that there is preserved in the British Museum a small tract, printed in London, of which the following is the title: 'A Bloody Almanack, fortelling many certaine predictions which shall come to pass this present yeare 1647; with a calculation concerning the time of the day of judgment, drawne out and published by that famous astrologer, the Lord Napier of Merchiston.'

But the fact is, that, although Napier did not himself profess to be either necromancer or astrologer, he cannot be altogether acquitted of pretending to this very insight into futurity which is here attributed to him. The first publication which he gave to the world was an exposition of the Revelations, which appeared at Edinburgh in 1593, prefaced by a dedication to James VI., which is characterized by singular plainness of speech. "Verily and in truth," says the writer, "such is the injury of this our present time, against both the church of God and your majesty's true lieges, that religion is despised and justice utterly neglected; for, what by atheists, papists, and cold professors, the religion of God is mocked in all estates; again, for partiality, prolixity, dearth, and deceitfulness of laws, the poor perish, the proud triumph, and justice is nowhere to be found." He then beseeches his majesty to attend himself to these enormities, assuring him that, if he act justly to his subjects, "God will ministrate justice to him against all his enemies; and contrarily, if otherwise." In redressing the evils denounced, he goes on to exhort him to "begin at his own house, family, and court;" a step, the necessity of which he endeavours to impress upon him at considerable length, and with extraordinary intrepidity. There is not a word of flattery in the whole epistle. As for the work itself, it is of a similar character to many others that have been written upon the same mysterious subjects. The most important proposition which it professes to demonstrate is, that the end of the world is to take place some time

between the years 1688 and 1700. It is a large and elaborate treatise, and is garnished occasionally with effusions in rhyme, sometimes original, and sometimes translated. Among other aids, the author presses the famous Sibylline Oracles into his service, ornamenting them with a metrical version and a commentary. This work appears to have attracted a great deal of attention on its first appearance, and to have retained its popularity for a considerable time. It did not, perhaps, cease to be generally remembered, till the termination of the seventeenth century effectually refuted its conclusions. A fifth edition of it, we observe, appeared at Edinburgh in 1645, which was, perhaps, not the last. It was translated into the French language, and published at Rochelle in 1602.*

Napier's mathematical studies, after all, however, probably did more to procure for him the reputation of being a magician than even these theological lucubrations. It was believed, it seems, that he was attended by a familiar spirit in the shape of a black cock. A curious anecdote, for the truth of which undoubted evidence exists, would even lead us to suppose that he was not himself averse to being thought in possession of certain powers or arts not shared by ordinary men. A document is still preserved, containing a contract which he entered into, in July, 1594, with a brother baron, Logan of Restalrig, to the effect that, "forasmuch as there were old reports and appearances that a sum of money was hid within Logan's house of Fastcastle, John Napier should do his utmost diligence to search and seek out, and by all craft and ingine to find out the same, and by the grace of God

* Napier's book probably occasioned some controversy. There is a MS. in the British Museum, entitled, 'Porta Lucis, or the way to decypher the name, number, and mark of the Beast, by a method more rational, free, and unstrained than ever any hitherto; occasioned by the peremptore determination of the Lord Napier of Merchistoune, upon the name Λατεινος.' The only part of the promised treatise, however, which the MS. contains is the Preface, in twelve and a half closely written folio pages.

shall either find out the same, or make it sure that no such thing has been there. For his reward he was to have the exact third of all that was found, and to be safely guarded by Logan back to Edinburgh with the same; and in case he should find nothing, after all trial and diligence taken, he refers the satisfaction of his travel and pains to the discretion of Logan.”* This, it will be observed, is very cautiously expressed, and so as not distinctly to advance on Napier’s part any claim to supernatural skill; but a person engaging in such negotiations could hardly be very much surprised, in that age, if he was held to be acquainted with more of the sciences than he chose to admit. The whole affair places before us a very curious picture of the times.

We do not know exactly when it was that Napier deserted theology for mathematics—having in this respect taken the opposite course to that followed long afterwards by the celebrated Count Swedenborg, who, having been all his previous life a mere man of science, began, when between fifty and sixty years of age, to see visions of the spiritual world, and to converse with angels. But the work upon the Apocalypse was, at any rate, the last of his theological publications. He is understood to have devoted his attention in subsequent years chiefly to astronomy, a science which, recently regenerated by Copernicus and Tycho Brahe, was then every day receiving new illustrations from the discoveries of Kepler and Galileo. The demonstrations, problems, and calculations of this science most commonly involve some one or more of the cases of trigonometry, or that branch of the mathematics which, from certain parts, whether sides or angles, of a triangle being given, teaches how to find the others which are unknown. On this account trigonometry, both plane and spherical, engaged much of Napier’s thoughts; and he spent a great deal of his time in endeavouring to contrive some methods by which the operations in both might be facilitated. Now these operations, the reader, who may be ignorant of mathematics, will observe,

* Douglas’s Peerage, by Wood, ii. 291.

always proceed by geometrical ratios, or proportions. Thus, if certain lines be described in or about a triangle, one of these lines will bear the same geometrical proportion to another as a certain side of the triangle does to a certain other side. Of the four particulars thus arranged three must be known, and then the fourth will be found by multiplying together certain two of those known, and dividing the product by the other. This rule is derived from the very nature of geometrical proportion, but it is not necessary that we should stop to demonstrate here how it is deduced. It will be perceived, however, that it must give occasion, in solving the problems of trigonometry, to a great deal of multiplying and dividing,—operations which, as every body knows, become very tedious whenever the numbers concerned are large; and they are generally so in astronomical calculations. Hence such calculations used to exact immense time and labour, and it became most important to discover, if possible, a way of shortening them. Napier, as we have said, applied himself assiduously to this object; and he was, probably, not the only person of that age whose attention it occupied. He was, however, undoubtedly the first who succeeded in it—which he did most completely by the admirable contrivance which we are now about to explain.

When we say that 1 bears a certain proportion, ratio, or relation to 2, we may mean any one of two things,—either that 1 is the half of 2, or that it is less than 2 by 1. If the former be what we mean, we may say that the relation in question is the same as that of 2 to 4, or of 4 to 8; if the latter, we may say that it is the same as that of 2 to 3, or of 3 to 4. Now in the former case we should be exemplifying what is called a *geometrical*; in the latter, what is called an *arithmetical* proportion: the former being that which regards the number of times, or parts of times, the one quantity is contained in the other; the latter regarding only the difference between the two quantities. We have already stated that the property of four quantities arranged in geometrical proportion is, that the *product* of the second and third, *divided*

by the first, gives the fourth. But when four quantities are in arithmetical proportion, the *sum* of the second and third, diminished by the *subtraction* of the first, gives the fourth. Thus, in the geometrical proportion 1 is to 2 as 2 is to 4, if 2 be multiplied by 2 it gives 4; which divided by 1 still remains 4: while in the arithmetical proportion 1 is to 2 as 2 is to 3, if 2 be added to 2 it gives 4; from which if 1 be subtracted, there remains the fourth term 3. It is plain, therefore, that, especially where large numbers are concerned, operations by arithmetical must be much more easily performed than operations by geometrical proportion; for in the one case you have only to add and subtract, while in the other you have to go through the greatly more laborious processes of multiplication and division.

Now it occurred to Napier, reflecting upon this important distinction, that a method of abbreviating the calculation of a *geometrical* proportion might perhaps be found, by substituting, upon certain fixed principles, for its known terms, others in *arithmetical* proportion, and then finding, in the quantity which should result from the addition and subtraction of these last, an indication of that which would have resulted from the multiplication and division of the original figures. It had been remarked before this, by more than one writer,* that if the series of numbers, 1, 2, 4, 8, &c., that proceed in geometrical progression, that is, by a continuation of geometrical ratios, were placed under, or alongside of, the series 0, 1, 2, 3, &c., which are in arithmetical progression, the addition of any two terms of the latter series would give a sum, which would stand opposite to a number in the former series indicating the product of the two terms in that series, which corresponded in place to the

* Namely, by H. Grammateus, in his 'Commercial Arithmetic,' published in German, at Vienna, in 1518; and more clearly by M. Stifels, in his *Arithmetica Integra*, printed at Nuremberg in 1544. See Montucla, *Histoire des Mathématiques*, ii. 19. Even Archimedes was acquainted with these relations.

two in the arithmetical series first taken. Thus, in the two lines,

1,	2,	4,	8,	16,	32,	64,	128,	256,
0,	1,	2,	3,	4,	5,	6,	7,	8,

the first of which consists of numbers in geometrical, and the second of numbers in arithmetical progression, if any two terms, such as 2 and 4, be taken from the latter, their sum 6, in the same line, will stand opposite to 64 in the other, which is the product of 4 multiplied by 16, the two terms of the geometrical series which stand opposite to the 2 and 4 of the arithmetical. It is also true, and follows directly from this, that if any three terms, as, for instance, 2, 4, 6, be taken in the arithmetical series, the sum of the second and third, diminished by the subtraction of the first, which makes 8, will stand opposite to a number (256) in the geometrical series which is equal to the product of 16 and 64 (the opposites of 4 and 6), divided by 4 (the opposite of 2).

Here, then, is, to a certain extent, exactly such an arrangement, or table, as Napier wanted. Having any geometrical proportion to calculate, the known terms of which were to be found in the first line or its continuation, he could substitute for them at once, by reference to such a table, the terms of an arithmetical proportion which, wrought in the usual simple manner, would give him a result that would point out or indicate the unknown term of the geometrical proportion. But unfortunately there were many numbers which did not occur in the upper line at all, as it here appears. Thus, there were not to be found in it either 3, or 5, or 6, or 7, or 9, or 10, or any other numbers, indeed, except the few that happen to result from the multiplication of any of its terms by 2. Between 128 and 256, for example, there were 127 numbers wanting, and between 256 and the next term (512) there would be 255 not to be found.

We cannot here attempt to explain the methods by which Napier's ingenuity succeeded in filling up these chasms, but must refer the reader, for full information upon this subject, to the professedly scientific works

which treat of the history and construction of logarithms.* Suffice it to say, that he devised a mode by which he could calculate the proper number to be placed in the table over against any number whatever, whether integral or fractional. The new numerical expressions thus found, he called *Logarithms*, a term of Greek etymology, which signifies the ratios of numbers. The table, however, which he published, in the first instance, in his *Mirifici Logarithmorum Canonis Descriptio*, which appeared at Edinburgh in 1614, contained only the logarithms of the sines of angles for every degree and minute in the quadrant, which shows that he chiefly contemplated, by his invention, facilitating the calculations of trigonometry. These logarithms differed also from those that are now in use, in consequence of Napier having chosen, originally, a different geometrical series from that which has since been adopted. He afterwards fixed upon the progression, 1, 10, 100, 1000, &c., or that which results from continued multiplication by 10, and which is the same according to which the present tables are constructed. This improvement, which possesses many advantages, had suggested itself about the same time to the learned Henry Briggs, then Professor of Geometry in Gresham College,—one of the persons who had the merit of first appreciating the value of Napier's invention, and who certainly did more than any other to spread the knowledge of it, and also to contribute to its perfection. Lilly, the astrologer, gives us, in his *Memoirs*, a curious account of the intercourse between Briggs and Napier, to which the publication of the logarithmic calculus led. "I will acquaint you," he writes, "with one memorable story, related unto me by John Marr, an excellent mathematician and geometrician, whom I conceive you remember. He was servant to King James and Charles

* See especially Montucla, *Histoire des Mathématiques*, ii. 16, &c.; Delambre, *Histoire de l'Astronomie Moderne*, i. 491, &c.; and, where the most complete history of logarithms is to be found, the Preface to Hutton's *Mathematical Tables*, London, 1785; which is reprinted in the first volume of Baron Maseres's *Scriptores Logarithmici*.

the First. At first, when the Lord Napier, or Marchiston, made public his logarithms, Mr. Briggs, then reader of the Astronomy Lectures at Gresham College, in London, was so surprised with admiration of them, that he could have no quietness in himself until he had seen that noble person, the Lord Marchiston, whose only invention they were; he acquaints John Marr herewith, who went into Scotland before Mr. Briggs, purposely to be there when these two so learned persons should meet. Mr. Briggs appoints a certain day when to meet at Edinburgh; but failing thereof, the Lord Napier was doubtful he would not come. It happened one day, as John Marr and the Lord Napier were speaking of Mr. Briggs; 'Ah, John,' said Marchiston, 'Mr. Briggs will not now come.' At the very instant one knocks at the gate; John Marr hasted down, and it proved Mr. Briggs, to his great contentment. He brings Mr. Briggs up into my lord's chamber, where almost one quarter of an hour was spent, each beholding other, almost with admiration, before one word was spoke. At last Mr. Briggs began: 'My lord, I have undertaken this long journey purposely to see your person, and to know by what engine of wit or ingenuity you came first to think of this most excellent help into astronomy, viz. the logarithms; but, my lord, being by you found out, I wonder nobody else found it out before, when now known it is so easy.' He was nobly entertained by the Lord Napier; and every summer after that, during the lord's being alive, this venerable man, Mr. Briggs, went purposely into Scotland to visit him."

Napier's discovery was very soon known over Europe, and was every where hailed with admiration by men of science. The great Kepler, in particular, honoured the author with the highest commendation, and dedicated to him his Ephemerides for 1617. This illustrious astronomer, also, some years afterwards, rendered a most important service to the new calculus, by first demonstrating its principle on purely geometrical considerations. Napier's own demonstration, it is to be observed, though exceedingly ingenious, had failed to satisfy many of the

mathematicians of that age, in consequence of its proceeding upon the supposition of the movement of a point along a line—a view analogous, as has been remarked, to that which Newton afterwards adopted in the exposition of his doctrine of fluxions, but one of which no trace is to be found in the methods of the ancient geometers.

Napier did not expound the process by which he constructed his logarithms in his first publication. This appeared only in a second work, published at Edinburgh in 1619, after the death of the author, by his third son, Robert. In this work also the logarithmic tables appeared in the improved form, in which, however, they had previously been published at London, by Mr. Briggs, in 1617. They have since then been printed in numberless editions, in every country of Europe. Nay, in the year 1721, a magnificent edition of them, in their most complete form, issued from the imperial press of Pekin, in China, in three volumes, folio, in the Chinese language and character. As for the invention itself, its usefulness and value have grown with the progress of science; and, in addition to serving still as the grand instrument for the abridgment of calculation in almost every department in which figures are employed, it is now found to be applicable to several important cases which could not be managed at all without its assistance. Some of the greatest names in the history of science, we may also remark, since Napier's time, have occupied themselves with the subject of the theory and construction of logarithms; and the labours of Newton, James Gregory, Halley, and Euler, have especially contributed to simplify and improve the methods for their investigation.

Napier, however, did not live long to enjoy the reputation of his discovery, having died at Merchiston on the 3rd of April, 1617, in the sixty-eighth year of his age. That same year he had published at Edinburgh a small treatise in Latin, of about one hundred and fifty pages, which he entitled '*Rabdologiæ seu Numerationis per Virgulas Libri Duo.*' It contained an account of a method of performing the operations of multiplication and division, by means of a number of small rods, having

the digits inscribed upon them according to such an arrangement, that, when placed alongside of each other in the manner directed, in order, for instance, to multiply any two lines of figures, the several lines of the product presented themselves, and had only to be transcribed and added up to give the proper result. This was not, however, nearly so convenient a contrivance as that of logarithms, even for multiplication, and it was still less useful in division; on which account it has been supposed that, although given to the world so late, it was probably an expedient which had suggested itself to Napier for the abridgment of calculation before his great invention. It has been thought, too, of so little practical utility as, in all likelihood, never to have been actually employed for the purposes of calculation.* A little tract, however, it may be remarked, appeared at London so late as the year 1684, entitled ‘*Enneades Arithmeticae*,’ containing, among other things, an account of “the Numbering Rods of the Right Honourable John, Lord Nepeer, enlarged;” and this work bears to be “printed for Joseph Moxon, at the sign of the Atlas in Ludgate street, *where also these numbering rods (commonly called Napier’s bones) are made and sold.*” These rods, or bones, we may add, are what Butler alludes to in his *Hudibras*, where, in the account of the “rummaging of Sidrophel,” he speaks of

“A moon-dial, *with Napier’s bones*,
And several constellation stones,†
Engraved in planetary hour,
That over mortals had strange power.”‡

* Montucla, *Histoire des Mathématiques*, ii. 26.

† A correspondent informs us that he has seen at Gartness, the place before-mentioned, globular stones with the circles of the sphere and constellations engraven on them, and concave stones with engravings of a like character, said to have been made by Napier. They were certainly not of modern date, and one is built into the wall of a mill, where it is still to be seen.

‡ Part ii. canto 3, v. 1095. See also Part iii. canto 2,

It was principally, as we have seen, with a view to the simplification of operations in trigonometry that Napier proposed the logarithmic calculus. This was not the only improvement which he contributed to that branch of science. Among others, it owes to him a formula of great elegance and convenience, by which the solution of all the cases of spherical trigonometry is comprehended under a single rule. This, with several other new views in the same department of the mathematics, appeared for the first time in his second work on logarithms, published at Edinburgh, as we have already mentioned, in 1619.

But his ingenious and contriving mind did not confine itself merely to speculative science, if we may believe the very curious statements which he makes with regard to some of his other inventions, in a paper with his signature, which is preserved among the manuscript collections of Anthony Bacon (the brother of the Lord Chancellor Bacon), in the archiepiscopal library at Lambeth. This paper, which has of late years been several times printed,* is entitled 'Secret Inventions, profitable and necessary in these days for the defence of this island, and withstanding of strangers, enemies to God's truth and religion.' Of these, the first is stated to be "a burning mirror for burning ships by the sun's beams," of which the author professes himself able to give to the world the "invention, proof, and perfect demonstration, geometrical and algebraical, with an evident demonstration of their error who affirm this to be made a parabolic section." The second is a mirror for producing the same effect by the beams of a material fire. The third is a piece of artillery contrived so as to send forth its shot, not in a single straight line, but in all directions,

v. 409. Professor Napier, of Edinburgh, is in possession of the set of bones said to have been used by the inventor of logarithms, from whom he claims to be descended.

* In Dr. Anderson's *Bee*, vol. iii. p. 133,—in Lord Buchan's *Life of Napier*,—in Tilloch's *Philosophical Magazine*, vol. xviii. pp. 53, &c., and elsewhere. There is also a copy of it in the British Museum, among the MS. collections of Dr. Birch.

in such a manner as to destroy every thing in its neighbourhood. Of this the writer asserts that he can give "the invention and visible demonstration." The fourth and last of these formidable machines is described to be "a round chariot in metal," constructed so as both to secure the complete safety of those within it, and, moving about in all directions, to break the enemy's array "by continual charges and shot of the arquebuse through small holes." "These inventions," the paper concludes, "besides devices of sailing under the water, and divers other devices and stratagems for harassing of the enemies, by the grace of God and work of expert craftsmen, I hope to perform. John Napier, of Merchiston, anno dom. 1596, June 2."

From this date it would appear that Napier's head had been occupied with the contrivances here spoken of long before he made himself known by those scientific labours by which he is now chiefly remembered; and, indeed, we might perhaps have inferred, even from the general nature of the inventions, and the object which the author avows he had in view by them, that they were the produce of that part of his life in which his apprehension of the encroachments of popery contributed to animate his studies. Some of the announcements are certainly very extraordinary, and would almost lead us to suppose that the writer in this paper rather intended to state what he conceived to be possible than what he had himself actually performed. Yet several of his expressions will not bear this interpretation; and there are not wanting other attestations which go to confirm what he asserts as to his having really constructed some of the machines he speaks of. There is a passage in a strange work, entitled 'The Jewel,' written by Sir Thomas Urquhart, and first published in 1652, which seems manifestly to allude to the third invention here enumerated. Sir Thomas, although certainly not the most veracious of authorities, would scarcely, one would think, have ventured to publish what we are now going to quote, only five and thirty years after Napier's death, if there had not been some foundation for his statement. His description may be

sufficiently overcharged (for he writes, it will be observed, in an extravagantly bombastic and hyperbolical strain), without being altogether a fiction. After eulogizing Napier's mathematical learning in very high-sounding terms, Sir Thomas proceeds to remark, that he deems him especially entitled to remembrance on account of "an almost incomprehensible device, which, being in the mouths of the most of Scotland, and yet unknown to any that ever was in the world but himself, deserveth very well to be taken notice of in this place ;"—"and," he adds, "it is this ; he had the skill (as is commonly reported) to frame an engine (for invention not much unlike that of Archytas' dove), which, by virtue of some secret springs, inward resorts, with other implements and materials fit for the purpose, inclosed within the bowels thereof, had the power, if proportionable in bulk to the action required of it (for he could have made it of all sizes), to clear a field of four miles circumference of all the living creatures exceeding a foot of height that should be found thereon, how near soever they might be to one another ; by which means he made it appear that he was able, with the help of this machine alone, to kill 30,000 Turks, without the aid of one Christian. Of this it is said that (upon a wager) he gave proof upon a large plain in Scotland, to the destruction of a great many heads of cattle and flocks of sheep, whereof some were distant from other half a mile on all sides, and some a whole mile."*

It were to have been desired, certainly, that our author had been a little more particular in his description of the scene of this devastating exploit among the cattle—"a large plain in Scotland," being rather an unsatisfactory form of expression, even in reference to a country where there are not a great many large plains ; but this indefinite mode of writing is only Sir Thomas's usual style. We are not inclined, indeed, to put much faith in the rumour here recorded that Napier actually put the power

* 'The Discovery of a most rare Jewel,' &c. second edit. Edinburgh, 1774, pp. 57, 58.

of his machine to the proof in the manner described ; but the whole statement, taken in conjunction with what we have found the alleged inventor asserting under his own hand, seems to put it beyond doubt that he had at least imagined some such contrivance as that alluded to in the above passage, and even that his having done so was matter of general notoriety in his own day, and for some time after. Sir Thomas Urquhart was born in 1613, some years before Napier's death, and his 'Jewel' was first published in 1652. Napier, he informs us, when requested on his death-bed to reveal the secret of this engine of such extraordinary potency in the destruction of cattle, sheep, and Turks, refused to do so, on the score of there being too many instruments of mischief in the world already for it to be the business of any good man to add to their number.* This will remind the reader of the story told respecting a machine of somewhat similar pretensions constructed at a later period by the celebrated James Gregory, of which Sir Isaac Newton, when it was shewn to him, is said to have expressed his disapprobation on the same ground which Napier is here made to take. But the truth is, as has been often remarked, that the introduction of machines capable of producing the tremendous effects ascribed to those in question would, in all probability, very soon put an end to war,—which has not become more destructive, but the reverse, since the invention of a more formidable artillery than that anciently in use ; and which, waged with such contrivances as those of Napier and Gregory, would certainly never be resorted to by nations as a mode of settling their differences, until they had become literally insane. Another consideration, however, which might suggest itself to a man of very scrupulous feelings on such a matter, is, that it would be unfair for him to put even his native country in possession of an instrument which would, in fact, give her an advantage in her disputes with the rest

* There is a common report amongst the people at Gartness, that this machine is buried in the ground, near the site of the old castle said to have been occupied by Napier.

of the world against which there would be no possibility of contending. If it put an end to war, which is one great evil, it would do so by the still greater evil of enabling a single nation to triumph over the prostration of the rest.

There appeared, some years ago, in one of our periodical works,* a very able and learned commentary on Napier's 'Secret Inventions,' the writer of which has collected, with great industry, whatever notices the annals of science afford of achievements similar to those which the Scottish mathematician is asserted to have performed. In regard to the mirror for setting objects on fire at a great distance by the reflected rays of the sun, he adduces the well-known story of the destruction of the fleet of Marcellus, at Syracuse, by the burning-glasses of Archimedes, and the other (not so often noticed) which the historian Zonaras records, of Proclus having consumed by a similar apparatus the ships of the Scythian leader Vitalian, when he besieged Constantinople in the beginning of the sixth century.† The possibility of such feats as these was long disbelieved; but may be considered as having been fully demonstrated by the experiments of modern times. Buffon, in particular, in the year 1747, by means of four hundred plane mirrors, actually melted lead and tin at a distance of fifty yards, and set fire to wood at a still greater. This, too, was in the months of March and April. With summer heat it was calculated that the same effects might have been produced at four hundred yards' distance—or more than ten times that to which, in all probability, Archimedes had to send his reflected rays. It may be concluded, therefore, that there is nothing absolutely incredible in the account Napier gives of his first invention. His second announcement, however, is a good deal more startling; inasmuch

* Tilloch's Philosophical Magazine, vol. xviii., pp. 53—65, (published Feb. 1804). See also pp. 245, &c.

† Malala, another old chronicler, however, says that Proclus operated, on this occasion, not by burning-glasses, but by burning sulphur showered upon the ships from machines. *Vid. Montucla, Histoire des Mathématiques*, i. 334.

as he here professes to have succeeded in an attempt in which nobody else is recorded to have made any approach to success. Gunpowder has been lighted by heat from charcoal collected by one concave mirror and reflected from another; but no such effect has ever been produced by a single reflection of artificial heat. It is not very easy to comprehend the nature of the chariot mentioned by Napier as his fourth invention; but it seems to bear some resemblance, this writer remarks, to one of the famous Marquis of Worcester's contrivances. As for the device for sailing under water, noticed in the last paragraph of the paper, that exploit was performed in Napier's own day, by the Dutch chemist Cornelius Drebell, who is reported to have constructed a vessel for king James I., which he rowed under the water on the Thames. It carried twelve rowers, besides several passengers, the air breathed by whom, it is said, was made again respirable by means of a certain liquor, the composition of which Boyle asserts in one of his publications that he knew, having been informed of it by the only person to whom it had been communicated by Drebell. Bishop Wilkins, also, who lived very near the time at which it was performed, expressly mentions Drebell's experiment, in his *Mathematical Magic*. Various successful essays in subaqueous navigation have also been made in more recent times.

It is to be lamented that the only one of Napier's inventions, the secret of which was solicited from him by his friends when he was leaving the world, should have been that which his conscience would not allow him to reveal, for the reason that has been stated. Had they asked him to explain to them his method of sailing under the water, for example, or even the construction of his burning mirrors, he probably would have had no excuse for withholding the information. But they seem to have been so anxious to get possession of the machine for destroying the thirty thousand Turks, that they had not a thought to spare for any of the other contrivances. The circumstance, however, of some of these inventions not having been re-discovered by any one else since

Napier's time ought not of itself to be taken as conclusive evidence that his pretensions to a knowledge of them were mere dreams. Extraordinary as is the progress that science has made within the last two centuries, during which period the conquests she has effected have been more numerous and wonderful than had been witnessed by all the previous centuries that had elapsed from the beginning of the world, there can be no doubt that some of her apparently new inventions have been only the forgotten discoveries of a preceding age revived, and also that there were some things known in former times which modern ingenuity has not yet recovered from oblivion. Such machines as those which Napier professes to have constructed are exactly of the description least likely, for very obvious reasons, to occur to a modern speculator.*

In that curious record, Birrell's Diary, which was published at Edinburgh some years ago, we find, under date of the 23rd October, 1598, the following notice: "Ane proclamation of the Laird of Merkistoun, that he tuik upon hand to make the land mair profitable nor it wes before, be the sawing of salt upon it." There can be little doubt, we think, that this was another scheme of the inventor of the logarithms; although the patent for the new mode of manuring appears to have been taken out in the name of his eldest son, Archibald, who had been infeft in the fee of the barony by his father about a year before.† The patent, or gift of office, as it is called,

* For a great deal of very curious information on the lost and revived inventions of antiquity, the reader may consult G. Pasch's learned work, entitled 'De Novis Inventis quorum accuratiori cultui facem praetulit antiquitas,' of which a second edition appeared at Leipsic in 1700; or Dutens's 'Recherches sur l'origine des découvertes attribuées aux modernes,' first published in 1766, and lately for the fourth time in 1812. Of this last work there is an English translation. See also Theod. Almeloveen's *Inventa Nov-Antiqua*.

† See Records of Privy Council for 22nd June, 1598, quoted in Douglas's Peerage, by Wood, ii. 292.

was granted upon condition that the patentee should publish an account of his method in print, which he did accordingly shortly afterwards, under the title of 'The new order of gooding and manuring all sorts of field land with common salt.' The facts that have been mentioned are interesting as establishing Napier's claim to an agricultural improvement which has been revived in our own day and considered of great value.* The profits of the invention were probably given up to his son, who was at this time a young man of only twenty-five years of age, from the same disinterested feeling which had led his father previously to enfeoff him in his estate. Devoted to his books, Napier may have been somewhat indifferent about money; and one of his contemporaries† even goes so far as to assert, that he dissipated his fortune by his experiments. Of this, however, there is no evidence; indeed, it appears that, occupied as much of his time was about other matters, he had taken good care of his property, which at his death was of large amount, both in land and in money, goods, and chattels. And, if he suggested this method of manuring with salt, he must be allowed to have directed his speculations occasionally to the improvement of the arts of common life, as well as to that of the abstract sciences.

Napier died on the 3rd of April, 1617. He was twice married, and had twelve children, of whom Archibald, the eldest, mentioned above, was raised to the peerage, by the title of Lord Napier, in 1627. A small volume of Memoirs of this person, written by himself, was published in 1793. There are said to be still in the possession of the family some productions of their distinguished ancestor on scientific subjects, which have not been printed, especially a treatise, in English, on Arithmetic and Algebra, and another, on Algebra, in Latin.‡

* See Parkes on 'The advantages of using Salt.'

† Thomas Dempster, a man of unquestionable learning and genius, but by no means to be always depended upon in what he states upon his own authority.

‡ Douglas's Peerage, by Wood, ii. 290. Since the first

The life which we have thus sketched may be considered as affording us an eminent example of the manner in which the many advantages enjoyed by the wealthy may be turned to account in the pursuit of learning and philosophy. A good education, access to all the best means of improvement, uninterrupted leisure, comparative freedom from the ordinary anxieties of life, the means of engaging in inquiries and experiments the expense of which cannot be afforded by the generality of students—the possession of all these things, to the mind that knows how to profit by them, is indeed invaluable. We have seen what they produced in Napier's case. In dedicating his time and his fortune to pursuits so much nobler than those that have usually occupied persons of his station, this illustrious individual had his ample reward. We can scarcely doubt that he led a happier life in his studious retirement, in the midst of his books and his experiments, than if he had given himself either to the ordinary pleasures of the world, or to the hazards and vexations of political ambition. The more useful and more honourable path he certainly chose. By his great and fortunate discovery he made the science of all succeeding times his debtor, and constituted himself the benefactor of every generation of posterity. And then for fame, which our very nature has made dear to us, that, too, this philosopher found in his closet of meditation. Even in his own day his renown was spread abroad over Europe, and he was greeted with the publicly expressed admiration of some of the most distinguished of his contemporaries; and the time that has since elapsed has only served to throw an increasing light around his name, which is now sure to retain its distinction so long as the sciences which he loved shall continue to be cultivated among men.

publication of the present work, much new information about the inventor of Logarithms has been given to the world by his descendant, Mark Napier, Esq., in 'Memoirs of John Napier of Merchiston,' 4to., Edin. and London, 1834.

CHAPTER XXVII.

Drummond of Hawthornden—Tycho Brahe—Tschirnhausen—Boyle—
The Air-Pump—Cavendish.



William Drummond.

It would be easy to add to that of Napier a long list of other names of men of wealth and rank, who, in like

manner, have devoted themselves to science or literature, in preference to all other pursuits. But we can afford to mention only a very few. One name which Napier's naturally suggests to us is that of his contemporary and countryman, WILLIAM DRUMMOND, of Hawthornden, one of the most elegant poetical writers of the early part of the seventeenth century. Drummond and Napier were neighbours, but probably no record has been preserved of any intercourse between the mathematician and the poet. As the former, however, was resorted to every year by his scientific English friend, Mr. Briggs, so the latter, also, had his visitor from the south, who came to pay his respects to him, from admiration of his kindred genius. In the year 1619, the famous Ben Jonson walked all the way from London to Hawthornden, to see his brother poet, and remained for some time as his guest. Of this visit a curious account is preserved, written by Drummond himself, which has been often printed. Drummond, who was distinguished for his learning as well as his poetry, died in 1649, in his sixty-fourth year, having lived through a very agitated period without mixing in its political convulsions, satisfied with philosophy and the muses. Another contemporary of Napier, whose labours and speculations were more similar to his own, was the celebrated Danish astronomer TYCHO BRAHE. Brahe's family was both wealthy and noble; but when he first manifested his attachment to the science, by his contributions to which he afterwards acquired so much reputation, being then only a boy at school, his friends did everything they could to check an inclination which they deemed quite unsuited to his birth and prospects; and the young astronomer was obliged to conceal from his tutor the mathematical books which he purchased with his pocket money, and to read them, as well as to make his observations on the stars, in hours stolen from the time allowed him for sleep. For, even before he was sixteen, he had begun to measure the distances of the heavenly bodies from one another, although he had no better instrument than a common pair of compasses, the hinge of which he used to put to his eye, while he

opened the legs until they pointed to the two stars whose relative position he wished to ascertain. A collection of celestial observations, made by him at this early period, is still preserved at Copenhagen. When he became of age, however, and was his own master, his fortune enabled him to choose his own pursuits; and, having first spent some years in travelling through Germany and Switzerland, and visiting the various observatories in these countries, he then returned home, took up his residence on his estate, and dedicated himself almost entirely to his favourite science. Some of the results of his studies which he published soon drew to him the attention of the learned among his countrymen; and, at the desire of the king, he at last left his retreat to teach astronomy in the capital. But the constant interruptions to which he was here exposed disgusted him with a town life; and he sighed to get once more back to his country retirement. All his wishes in this respect were at length gratified, by an act of extraordinary munificence on the part of his royal master, who bestowed on him the island of Huen, in the Sound, together with a pension of five hundred crowns, a lordship in Norway, and an ecclesiastical benefice, which brought him two thousand crowns more, in order that with these revenues, added to those of his original estates, he might be enabled to prosecute his celestial observations on the grandest scale. In this island, accordingly, Brahe now took up his abode, and soon erected on it a splendid observatory, provided with all the best instruments known in that age. He spent, he says, a hundred thousand crowns of his own money upon its completion, in addition to the produce of his grants from the king. Here he resided for seventeen years, during the whole of which time he continued to devote himself, with unabated zeal, to his scientific pursuits. But such was now his fame, that, even in this retirement, besides being surrounded, as before, by pupils who crowded to profit by his instructions, he was sought out by many visitors, both from his own and foreign countries. Among other persons of distinction who came to see him, was our James I., then king of Scotland, who passed a week

with him in the year 1590 ; but, if the story that is told be true, this visit was anything rather than a fortunate incident for Brahe. Some years afterwards, it is said, his protector, Frederick II., being dead, he was visited one day by the young king Christian IV., accompanied by his chief minister, Walckendorf ; and it so happened that this latter personage, who was very sensitive and choleric, was barked at, as he approached the house, by two dogs belonging to the astronomer, at which he chose to be so much offended, that he went up to the animals and beat them severely. The dogs had been presented to Brahe by the Scottish monarch ; and, irritated at seeing them ill-treated, he interfered to prevent the enraged senator from continuing his chastisement. This gave rise to some high words between the two, and the result was a quarrel, which Walckendorf, at least, never forgot. From that day, Brahe's ruin was resolved upon by his powerful enemy. A commission was soon after appointed to report upon the public utility of his establishment ; and, upon this compliant body declaring that they saw nothing in his splendid observatory but a source of useless expense to the state, a decree was passed recalling all the grants he had received from the former king, and dispossessing him of his island. On this, Brahe determined to bid adieu for ever to his ungrateful country ; and, taking with him all his instruments, he retired to Germany. About two years afterwards, however, he was invited to take up his residence at Prague, by the Emperor, Rodolph II. ; and by this prince, who was warmly attached to science, he was provided with a second asylum, almost as splendid as that which he had enjoyed in his native country. But he lived only a very short time after this, having died in 1601, in the fifty-fifth year of his age. Tycho Brahe, as most of our readers are probably aware, was the inventor or reviver of a peculiar scheme of the universe, according to which the earth is conceived to be immoveable in the centre of the system, the sun to revolve round it, and the other planets round the sun. It is unnecessary to say that this hypothesis has been long exploded. Indeed, even at the time when it was

posed by its author, it was, although supported by him with much ingenuity, a most unphilosophical retrogression from the true system previously established by Copernicus. But, although Brahe, it thus appears, has no very high claims upon our admiration as a theorist, he undoubtedly did much in another way to promote the improvement of astronomy. His extraordinary devotion to the science, of itself, operated as an inspiration upon many of the other ardent minds of the time. But it was by the great number and comparative exactness of his observations, far surpassing anything that had been attained by his predecessors, that he chiefly contributed to the progress of astronomy. No other but one in his circumstances could have commanded either the leisure or the pecuniary means necessary for the making of those observations, which, besides having occupied many years, owed much of their superior accuracy to the excellence and consequent costliness of the instruments which Brahe employed. Here, therefore, was a case in which science was indebted to the wealth of one of its cultivators for services which no zeal or talents could have otherwise enabled him to render.

Another man of fortune, to whom both science and the arts are under considerable obligations, is the German mathematician, TSCHIRNHAUSEN, celebrated for the discovery of the peculiar curve called, after him, Tschirnhausen's Caustics. He was born in 1651, at the seat of his ancestors, in Upper Lusatia; and, although, after receiving an excellent education, he entered the army at an early age, he very soon quitted the profession of a soldier, and set out on his travels through England, Italy, and France. He spent several years in traversing these countries, embracing every opportunity of obtaining a knowledge of their arts, manufactures, and productions, and seeking the acquaintance of the learned men of the time, wherever he went. On returning home, he took up his residence on his estate, the revenues of which were ample; and the remainder of his life was given to scientific speculations and experiments. The science of optics was that to which he was chiefly attached; and it was

while making some experiments with reflecting mirrors, that he discovered his Caustics, which are curves formed by light reflected in certain circumstances, and are so called from the Greek word for a burning-glass. They possess some remarkable geometrical properties.* When Tschirnhausen announced this discovery to the French Academy of Sciences, he was only in his thirty-first year; but he was immediately admitted a member of the Academy by order of the King, Louis XIV. In order to have the aid of proper instruments in the prosecution of his researches, he afterwards established three glass-houses in his native district; at which he employed all the resources of his ingenuity in endeavouring to fabricate burning-glasses of greater size and power than any which had ever been elsewhere produced. In 1687 he had made a concave reflecting mirror of copper, of the diameter of four feet and a half, which consumed wood and fused metals at twelve feet distance, in a few seconds; but, although these effects greatly surpassed anything of the same kind that had been accomplished in modern times, he found the inconvenience of operating by reflection so great, that he determined to persevere in his attempts to obtain, if possible, a lens of equal magnitude. He did not exactly attain this object; for the largest lens he succeeded in producing had only a diameter of three feet. But when it is added that nobody but himself had ever before made one of more than four or five inches' diameter, his success will probably be deemed sufficiently extraordinary. The method he employed in fabricating this immense glass is not known. It was convex on both sides, and weighed a hundred and sixty pounds. Although somewhat less in size, its effects greatly exceeded those of the reflector he had formerly used. This lens was

* In an article of some length upon Tschirnhausen, in the *Biographie Universelle*, the writer, M. Gley, by a strange blunder, mistakes these curves for actual burning-glasses; and describes, with great minuteness, their wonderful powers in kindling and consuming, or melting, wood, iron, tiles, slates, and earthen-ware!—Vid. *Biog. Univ.* xlvii. 3.

purchased from Tschirnhausen by the Duke of Orleans, who afterwards made a present of it to the Academy of Sciences. Tschirnhausen deserves, also, to be remembered as the founder of the celebrated porcelain manufactory of Dresden. Before his time it was supposed that the Chinese employed for their porcelain a peculiar earth, only found in their own country; but he discovered that the same species of ware could be manufactured from a compound of different sorts of earth, which might be obtained in Europe as well as in China. This eminent benefactor to the arts, who, besides his contributions to the Transactions of the French Academy, was also the author of two separate works,—the first, entitled *The Medicine of the Body*, the latter, *The Medicine of the Mind*, being, in fact, a system of the art of reasoning,—died in 1708.

But, perhaps, the best example we can adduce of the manner in which wealth may be made subservient by its possessor, not only to the acquisition of knowledge, but also to its diffusion and improvement, is that of our celebrated countryman, the Honourable ROBERT BOYLE. Boyle was born at Lismore, in Ireland, in 1627, and was the seventh and youngest son of Richard, the first earl of Cork, commonly called the Great Earl. The first advantage which he derived from the wealth and station of his father was an excellent education. After having enjoyed the instructions of a domestic tutor, he was sent, at an early age, to Eton. But his inclination, from the first, seems to have led him to the study of things, rather than of words. He remained at Eton only four years, “in the last of which,” according to his own statement, in an account which he has given us of his early life, “he forgot much of that Latin he had got, for he was so addicted to more solid parts of knowledge, that he hated the study of bare words naturally, as something that relished too much of pedantry, to consort with his disposition and designs.” In reference to what is here insinuated, in disparagement of the study of languages merely as such, we may just remark that the observation is, perhaps, not quite so profound as it is plausible. So long

as one mind differs from another, there will always be much difference of sentiment as to the comparative claims upon our regard of that, on the one hand, which addresses itself principally to the taste or the imagination, and that, on the other, which makes its appeal to the understanding only. But it is, at any rate, to be remembered that, in confining the epithet useful, as is commonly done, to the latter, it is intended to describe it as the useful only pre-eminently, and not exclusively. The agreeable or the graceful is plainly also useful. The study of language and style, therefore, cannot with any propriety be denounced as a mere waste of time; but, on the contrary, is well fitted to become to the mind a source both of enjoyment and of power. So great, indeed, is the influence of diction upon the common feelings of mankind, that no literary work, it may be safely asserted, has ever acquired a permanent reputation and popularity, or, in other words, produced any wide and enduring effect, which was not distinguished by the graces of its style. Their deficiency, in this respect, has been at least one of the causes of the comparative oblivion into which Mr. Boyle's own writings have fallen, and, doubtless, weakened the efficacy of such of them as aimed at anything beyond a bare statement of facts, even in his own day. It was this especially which exposed some of his moral lucubrations to Swift's annihilating ridicule.

On being brought home from Eton, Boyle, who was his father's favourite son, was placed under the care of a neighbouring clergyman, who, instructing him, he says, "both with care and civility, soon brought him to renew his first acquaintance with the Roman tongue, and to improve it so far that in that language he could readily enough express himself in prose, and began to be no dull proficient in the poetic strain." "Although, however," he adds, "naturally addicted to poetry, he forbore, in after-life, to cultivate his talent for that species of composition, because, in his travels, having by discontinuance forgot much of the Latin tongue, he afterwards never could find time to redeem his losses by a serious study of the ancient poets." From all this it is evident that the

natural bent of his mind did not incline him very strongly to classical studies; and as, for the most obviously wise purposes, there has been established among men a diversity of intellectual endowments and tendencies, and every mind is most efficient when it is employed in accordance with its natural dispositions and predilections, it was just as well that the course of his education was now changed. In his eleventh year he and one of his brothers were put under the charge of a Mr. Marcombes, a French gentleman, and sent to travel on the Continent. In the narrative of his early life, in which he designates himself by the name of Philoretus, Mr. Boyle has left us an account of his travelling tutor. "He was a man," says he, "whose gait, his mien, and outside, had very much of his nation, having been divers years a traveller and a soldier; he was well fashioned, and very well knew what belonged to a gentleman. His natural were much better than his acquired parts, though divers of the latter he possessed, though not in an eminent, yet in a competent degree. Scholarship he wanted not, having in his greener years been a professed student in divinity; but he was much less read in books than men, and hated pedantry as much as any of the seven deadly sins. . . . Before company he was always very civil to his pupils, apt to eclipse their failings and set off their good qualities to the best advantage. But in his private conversation he was cynically disposed, and a very nice critic both of words and men; which humour he used to exercise so freely with Philoretus, that at last he forced him to a very cautious and considerate way of expressing himself, which after turned to his no small advantage. The worst quality he had was his choler, to excesses of which he was excessively prone; and, that being the only passion to which Philoretus was much observed to be inclined, his desire to shun clashing with his governor, and his accustomedness to bear the sudden sallies of his impetuous humour, taught our youth so to subdue that passion in himself, that he was soon able to govern it habitually and with ease."

Under the guidance of this gentleman, who, although

not much fitted, apparently, to make his pupils profound scholars, or even to imbue them with a taste for elegant literature, was, probably, very well qualified both to direct their powers of observation, and to superintend and assist the general growth of their minds at this early age, the two brothers passed through France to Geneva, where they continued some time studying rhetoric, logic, mathematics, and political geography, to which were added the accomplishments of fencing and dancing. "His recreations during his stay at Geneva," says Mr. Boyle of himself, "were sometimes mall, tennis (a sport he ever passionately loved), and, above all, the reading of romances, whose perusal did not only extremely divert him, but (assisted by a total discontinuance of the English tongue) in a short time taught him a skill in French somewhat unusual to strangers." The party afterwards set off for Italy; and, after visiting Venice and other places, proceeded to Florence, where they spent the winter.

While residing here, Mr. Boyle made himself master of the Italian language. But another acquisition, for which he was indebted to his visit to Florence, probably influenced to a greater extent the future course of his pursuits; we mean the knowledge he obtained of the then recent astronomical discoveries of Galileo. This great philosopher died in the neighbourhood of Florence, in the beginning of the year 1642, while Boyle and his brother were pursuing their studies in that city. The young Englishman, who was himself destined to acquire so high a reputation by his experiments in various departments of physical science, some of them the same which Galileo had cultivated, probably never even beheld his illustrious precursor; but we cannot tell how much of Boyle's love of experimental inquiry, and his ambition to distinguish himself in that field, may have been caught from this his accidental residence in early life in a place where the renown of Galileo and his discoveries must have been on the lips of all.

Boyle returned to England in 1644. Although he was yet only in his eighteenth year, he seems to have thought that his education had been long enough under the direc-

tion of others, and he resolved, therefore, for the future, to be his own instructor. Accordingly, his father being dead, he retired to an estate which had been left him in Dorsetshire, and gave himself up, we are told, for five years, to the study principally of natural philosophy and chemistry. His literary and moral studies, however, it would appear, were not altogether suspended during this time. In a letter written by him from his retirement to his old tutor, Mr. Marcombes, we find him mentioning, as also among his occupations, the composing of essays in prose and verse, and the study of ethics, "wherein," says he, "of late I have been very conversant, and desirous to call them from the brain down into the breast, and from the school to the house."

These details do not, like many of those we have given in former parts of our work, exhibit to us the ardent lover of knowledge, beset with impediments at every step, in his pursuit of the object on which he has placed his affections, and having little or nothing to sustain him under the struggle, except the unconquerable strength of the passion with which his heart is filled. On the contrary, we have here a young man who has enjoyed from his birth upwards every facility for the improvement of his mind, and is now surrounded with all the conveniences he could desire, for a life of the most various and excursive study. A happy and enviable lot! Yet by how few of those to whom it has been granted, as well as to him of whom we are now speaking, have its advantages been used as they were by him! The truth is, that, if the mind be not in love with knowledge, no mere outward advantages will enable any one to make much progress in the pursuit of it; while, with this love for it, all the difficulties which the unkindness of fortune can throw in the way of its acquisition may be overcome. The examples we have already recorded of many a successful struggle with such difficulties in their most collected and formidable strength, sufficiently warrant us to hold out this encouragement to all.

In the same letter to Mr. Marcombes, which we have just quoted, we find Boyle making mention, for the first

time, of what he calls "our new Philosophical or Invisible College," some of the leading members of which, he informs his correspondent, occasionally honoured him with their company at his house. By this *Invisible College*, he undoubtedly means that association of learned individuals who began about this period to assemble together in London for the purposes of scientific discussion, and whose meetings formed the germ of the Royal Society. According to the account given in a letter written many years after by Dr. Wallis, another member of the club, to his friend Dr. Thomas Smith, it appears that these meetings first began to be held in London, on a certain day in every week, about the year 1645. Mr. Boyle's name does not occur in the list of original members given by Dr. Wallis; but he professes to mention only several of the number. There can be no doubt that Boyle joined them soon after the formation of the association. According to Dr. Wallis, the meetings were first suggested by a Mr. Theodore Haak, whom he describes as a German of the Palatinate, then resident in London. They used to be held sometimes in Wood-street, at the house of Dr. Goddard, the eminent physician, who kept an operator for grinding glasses for telescopes and microscopes; sometimes at another house in Cheapside; and sometimes in Gresham College, to which several of the members were attached. The subjects of inquiry and discussion are stated to have embraced everything relating to "physic, anatomy, geometry, astronomy, navigation, magnetics, chemics, mechanics, and natural experiments," whatever, in short, belonged to what was then called "the new or experimental philosophy." In course of time, several of the members of the association were removed to Oxford; and they began at last to meet by themselves in that city, while the others continued their meetings in London. The Oxford meetings began to be regularly held about the year 1649. In 1654 Mr. Boyle took up his residence at Oxford, probably induced, in great part, by the circumstance of so many of his philosophical friends being now there, and engaged together in the same inquiries with himself. The Oxford associates, ac-

according to Dr. Wallis, met first in the apartments of Dr. Petty (afterwards the celebrated Sir William Petty, the ancestor of the Marquis of Lansdowne), who lodged, it seems, in the house of an apothecary, whose store of drugs was found convenient for their experiments. On Dr. Petty going to Ireland, they next met, the narrative proceeds, “(though not so constantly) at the lodgings of Dr. Wilkins, then warden of Wadham College; and, after his removal to Trinity College in Cambridge, at the lodgings of the honourable Mr. Robert Boyle, then resident for divers years in Oxford.” Boyle, indeed, continued to reside in this city till the year 1668. Meanwhile, in 1663, three years after the Restoration, the members of the London club were incorporated under the title of the Royal Society.

It was during his residence at Oxford that Boyle made some of the principal discoveries with which his name is connected. In particular, it was here that he prosecuted those experiments upon the mechanical properties of the air, by which he first made himself generally known to the public, and the results of which rank among the most important of his contributions to natural science. The first account which he published of these experiments appeared at Oxford in 1660, under the title of ‘*New Experiments Physico-Mechanical, touching the spring of the air and its effects.*’ The work is in the form of letters to his nephew, Viscount Dungarvon, the son of the Earl of Cork, which are dated in December 1659. It may be not unnaturally supposed that Boyle’s attention was first directed to the subject of Pneumatics when he was engaged at Florence in making himself acquainted with the discoveries of Galileo, whose experiments first introduced anything like science into that department of inquiry. He states, himself, in his first letter to his nephew, that he had some years before heard of a book, by the Jesuit Schottus, giving an account of a contrivance, by which Otto Guericke, Consul of Magdeburg, had succeeded in emptying glass vessels of their contained air, by sucking it out at the mouth of the vessel, plunged under water. He alludes here to Guericke’s

famous invention of the instrument now commonly called the air-pump. This ingenious and ardent cultivator of science, who was born at Magdeburg, in Saxony, in the beginning of the seventeenth century, in his original attempts to produce a vacuum, used first to fill his vessel with water, which he then sucked out by a common pump, taking care, of course, that no air entered to replace the liquid. This method was probably suggested to Guericke by Torricelli's beautiful experiment, mentioned in our first volume,* with the barometrical tube, the vacuum produced in the upper part of which, by the descent of the mercury, has been called from him the Torricellian vacuum. It was by first filling it with water that Guericke expelled the air from the copper globe, the two closely fitting hemispheres comprising which six horses were then unable to pull asunder, although held together by nothing more than the pressure of the external atmosphere. This curious proof of the force, or weight of the air, which was exhibited before the Emperor Ferdinand III., in 1654, is commonly referred to by the name of the experiment of the Magdeburg hemispheres. Guericke, however, afterwards adopted another method of exhausting a vessel of its contained air, which could be applied more generally than the one he had first employed. This consisted in at once pumping out the air itself. The principle of the contrivance which he used for that purpose will be understood from the following explanation. If we suppose a barrel of perfectly equal bore throughout, and having in it a closely fitting plug or piston, to have been inserted in the mouth of the vessel, it is evident that, when this piston was drawn up from the bottom to the top of the barrel, it would carry along with it all the air that had previously filled the space through which it had passed. Now were air, like water, possessed of little or no expansive force, this space, after being thus deprived of its contents, would have remained empty, and there would have been an end of the experiment. But, in consequence of the extraordinary elasticity

* *Vide* vol. i. p. 16.

of the element in question, no sooner would its original air be lifted by the piston out of the barrel, than a portion of that in the vessel beyond the piston would flow out to occupy its place. The vessel and the barrel together would now, therefore, be filled by the same quantity of air which had originally been contained in the first alone, and which would consequently be diminished in density just in proportion to the enlargement of the space which it occupied. But, although so much of the air to be extracted had thus got again into the barrel, there would still at this point have been an end of the experiment, if no way could have been found of pushing back the piston for another draught, without forcing also the air beyond it into the vessel again, and thus merely restoring matters to the state in which they were at the commencement of the operation. But here Guericke was provided with an ingenious contrivance—that of the valve; the idea of applying which he borrowed, no doubt, from the common water-pump, in which it had been long used. A valve, which, simple as it is, is one of the most useful and indeed indispensable of mechanical contrivances, is, as most persons know, merely a flap, or lid, moving on a hinge, which, covering an orifice, closes it, of course, against whatever attempts to pass through from behind itself (a force bearing upon it from thence evidently only shutting it closer), while it gives way to and permits the passage of whatever comes in the opposite direction. Now Guericke, in his machine, had two of these valves, one covering a hole in the piston, another covering the mouth of the vessel where the barrel was inserted; and both opening outwards. In consequence of this arrangement, when the piston, after having been drawn out, as we have already described, was again pushed back, the air in the barrel was prevented from getting back into the vessel by the farther valve, now shut against it, while it was at the same time provided with an easy means of escape by the other, through which, accordingly, it passed away. Here then was one barrel-full of the air in the vessel dislodged; and the same process had only to be repeated a sufficient number of

times, in order to extract as much more as was desired. The quantity, however, removed every time was, of course, always becoming less; for, although it filled the same space, it was more attenuated.

The principle, therefore, upon which the first air-pump was constructed, was the expansibility of the air, which the inventor was enabled to take advantage of through means of the valve. These two things, in fact, constitute the air-pump; and whatever improvements have been since introduced in the construction of the machine have gone only to make the working of it more convenient and effective. In this latter respect the defects of Guericke's apparatus, as might be expected, were considerable. Among others with which it was chargeable, it required the continual labour of two men for several hours at the pump to exhaust the air from a vessel of only moderate size; the precautions which Guericke used to prevent the intrusion of air from without, between the piston and the sides of the barrel, during the working of the machine, were both imperfect for that purpose, and greatly added to the difficulties and incommodiousness of the operation; and, above all, from the vessel employed being a round globe, without any other mouth or opening than the narrow one in which the pump was inserted, things could not be conveyed into it, nor, consequently, any experiments made in that vacuum which had been obtained. Boyle, who says that he had himself thought of something like an air-pump before he heard of Guericke's invention, applied himself, in the first place, to the remedying of these defects in the original instrument, and succeeded in rendering it considerably more convenient and useful. At the time when he began to give his attention to this subject, he had Robert Hooke, who afterwards attained a distinguished name in science, residing with him as an assistant in his experiments; and it was Hooke, he says, who suggested to him the first improvements in Guericke's machine. These, which could not easily be made intelligible by any mere description, and which, besides, have long since given way to still more commodious modifica-

tions of the apparatus, so that they possess now but little interest, enabled Boyle and his friends to carry their experiments with the new instrument much farther than had been done by the Consul of Magdeburg. But, indeed, Boyle himself did not long continue to use the air-pump which he describes in his first publication. In the second part of his *Physico-Mechanical Experiments* he describes one of a new construction; and, in the third part of the same work, one still farther improved. This last, which is supposed to have been also of Hooke's contrivance, had two barrels moved by the same pinion-wheel, which depressed the one while it elevated the other, and thus did twice as much work as before in the same time. The air-pump has been greatly improved since the time of Boyle by the Abbé Nollet, Gravesande, Smeaton, Prince, Cuthbertson, and others.

By his experiments with this machine Boyle made several important discoveries with regard to the air, the principal of which he details in the three successive parts of the work we have mentioned. Having given so commodious a form and position to the vessel out of which the air was to be extracted (which, after him, has been generally called the receiver, a name, he says, first bestowed upon it by the glassmen) that he could easily introduce into it anything which he wished to make the subject of an experiment, he found that neither flame would burn nor animals live in a vacuum, and hence he inferred the necessity of the presence of air both to combustion and animal life. Even a fish, immersed in water, he proved, would not live in an exhausted receiver. Flame and animal life, he shewed, were also both soon extinguished in any confined portion of air, however dense, although not so soon in a given bulk of dense as of rarefied air; nor was this, as had been supposed, owing to any exhalation of heat from the animal body or the flame, for the same thing took place when they were kept in the most intense cold, by being surrounded with a frigorific mixture. What he chiefly sought to demonstrate, however, by the air-pump was the extraordinary elasticity, or spring, as he called it, of

the air. It is evident, from the account that has been given of the principle of this machine, that, if the pump be worked ever so long, it never can produce in the receiver a strictly perfect vacuum; for the air expelled from the barrel by the last descent of the piston must always be merely a portion of a certain quantity, the rest of which will be in the receiver. The receiver, in truth, after the last stroke of the piston, is as full of air as it was at first; only that by which it is now filled is so much rarefied and reduced in quantity, although it occupies the same space as before, that it may be considered as, for most practical purposes, annihilated. Still a certain quantity, as we have said, remains, be it ever so small; and this quantity continues, just as at first, to be diffused over the whole space within the receiver. From this circumstance Boyle deduced some striking evidences of what seems to be the almost indefinite expansibility of the air. He at last actually dilated a portion of air to such a degree that it filled, he calculated, 13,679 times its natural space, or that which it occupied as part of the common atmosphere. But the usual density of the atmosphere is very far from being the greatest to which the air may be raised. It is evident that, if the two valves of the air-pump we have already described be made to open inwards instead of outwards, the effect of every stroke of the piston will be, not to extract air from the receiver, but to force an additional quantity into it. In that form, accordingly, the machine is called a forcing-pump, and is used for the purpose of condensing air, or compressing a quantity of it into the smallest possible space. Boyle succeeded, by this method, in forcing into his receiver forty times its natural quantity. But the condensation of the air has been carried much farther since his time. Dr. Hales compressed into a certain space 1522 times the natural quantity, which in this state had nearly twice the density, or, in other words, was nearly twice as heavy as the same bulk of water. Of the air thus condensed by Dr. Hales, therefore, the same space actually contained above twenty millions of times the quantity which it would have done of that dilated

the highest degree by Mr. Boyle. How far do these experiments carry us beyond the knowledge of Aristotle, who held that the air, if rarefied so as to fill ten times its usual space, would become fire !

We have dwelt the longer upon these details, both as referring to some of the most important contributions for which science is indebted to Mr. Boyle, and because they serve to continue the brief sketch of discoveries relating to the air which we have given in our first volume.*

On leaving Oxford, in 1668, Boyle came to London, and here he continued to reside during the remainder of his life. Up to this time his attendance at the meetings of the Royal Society had been only occasional, but he was now seldom absent. Science, indeed, was as much the occupation of his life as if it had been literally his business or profession. No temptations could seduce him away from his philosophical pursuits. Belonging, as he did, to one of the most powerful families in the kingdom—having no fewer than four brothers in the Irish peerage, and one in the English,—the highest honours of the state were open to his ambition if he would have accepted of them. But so pure was his love of science and learning, and, with all his acquirements, so great his modesty, that he steadily declined even those worldly distinctions which might be said to lie strictly within the sphere of his pursuits. He was zealously attached to the cause of religion, in support of which he wrote and published several treatises ; but he would not enter the church, although pressed to do so by the king, or even accept of any office in the universities, under the conviction that he should more effectually serve the interests both of religion and learning by avoiding everything which might give him the appearance of being their hired or interested advocate. He preferred other modes of shewing his attachment, in which his wealth and station enabled him to do what was not in the power of others. He allowed himself to be placed at the head of associations for the prosecution of those objects which he

* See vol. i., pp. 14, &c.

had so much at heart ; he contributed to them his time, his exertions, and his money ; he printed, at his own expense, several editions of the Scriptures in foreign languages for gratuitous distribution ; if learned men were in pecuniary difficulties his purse was open to their relief. And, as for his own labours, no pay could have made them more zealous or more incessant. From his boyhood till his death he may be said to have been almost constantly occupied in making philosophical experiments ; collecting and ascertaining facts in natural science ; inventing or improving instruments for the examination of nature ; maintaining a regular correspondence with scientific men in all parts of Europe ; receiving the daily visits of great numbers of the learned both of his own and other countries ; perusing and studying not only all the new works that appeared in the large and rapidly widening department of natural history and mathematical and experimental physics, including medicine, anatomy, chemistry, geography, &c., but many others, relating especially to theology and oriental literature ; and, lastly, writing so profusely upon all these subjects, that those of his works alone which have been preserved and collected, independently of many others that are lost, fill, in one edition, six large quarto volumes. So vast an amount of literary performance, from a man who was at the same time so much of a public character, and gave so considerable a portion of his time to the service of others, shews strikingly what may be done by industry, perseverance, and such a method of life as never suffers an hour of the day to run to waste.

In this last particular, indeed, the example of Mr. Boyle well deserves to be added to those of the other great men we have already mentioned. Of his time he was, from his earliest years, the most rigid economist, and he preserved that good habit to the last. Dr. Dent, in a letter to Dr. Wotton, tells us that “his brother, afterwards Lord Shannon (who accompanied him on his continental tour with Mr. Marcombes) used to say, that, even then, he would never lose any vacant time ; for, if they were upon the road and walking down a hill, or in

a rough way, he would read all the way ; and, when they came, at night, to their inn, he would still be studying till supper, and frequently propose such difficulties as he met with in his reading to his governor." The following naïve statement, too, which we find in an unfinished essay on a theological subject, which he left behind him in manuscript, and of which Dr. Birch, the editor of his collected works, has printed a part, may serve to show the diligence with which he prosecuted his severer studies, even amidst all sorts of interruptions. "It is true," he writes, "that a solid knowledge of that mysterious language" [it is his acquisition of the Hebrew tongue to which he refers] "is somewhat difficult, but not so difficult but that so slow a proficient as I could, in less than a year, of which not the least part was usurped by frequent sicknesses and journeys, by furnaces, and by (which is none of the modestest thieves of time) the conversation of young ladies, make a not inconsiderable progress towards the understanding of both Testaments in both their originals." But the life of active and incessant occupation which he led, even in his declining years, is best depicted in another curious document which Dr. Birch has preserved. A few years before his death he was urged to accept the office of President of the Royal Society, of which he had so long been one of the most active and valuable members, and the Transactions of which he had enriched by many papers of great interest ; but he declined the honour on the score of his growing infirmities. About this time he also published an advertisement, addressed to his friends and acquaintances, in which he begins by remarking "that he has, by some unlucky accidents, had many of his writings corroded here and there, or otherwise so maimed" (this is a specimen of the pedantic mode of expression of which Mr. Boyle was too fond), "that, without he himself fill up the *lacunæ* out of his memory or invention, they will not be intelligible." He then goes on to allege his age and his ill health as reasons for immediately setting about the arrangement of his papers, and to state that his physician and his best friends have "pressingly advised him

against speaking daily with so many persons as are wont to visit him ;” representing it as that which must “disable him for holding out long.” He, therefore, intimates that he means in future to reserve two days of the week to himself, during which, “unless upon occasions very extraordinary,” he must decline seeing either his friends or strangers, “that he may have some time both to recruit his spirits, to range his papers, and fill up the *lacunæ* of them, and to take some care of his affairs in Ireland, which are very much disordered, and have their face often changed by the public disorders there.” He at the same time ordered a board to be placed over his door, giving notice when he did and when he did not receive visits.

Nothing can set in a stronger light than this the celebrity and public importance to which he had attained. His reputation, indeed, had spread over Europe ; and he was the principal object of attraction to all scientific strangers who visited the English metropolis. Living, as it was his fortune to do, at what may be called only the dawn of modern science, Boyle perhaps made no discovery which the researches of succeeding investigators in the same department have not long ere now gone far beyond. But his experiments, and the immense number of facts which he collected and recorded, undoubtedly led the way to many of the most brilliant results by which, since his day, the study of nature has been crowned. Above all, he deserves to be regarded as one of the principal founders of our modern chemistry. That science, before his time, was little better than a collection of dogmas, addressing themselves rather to the implicit faith of men than either to their experience or their reason. These venerable articles of belief he shewed the necessity of examining, in reference to their agreement with the ascertained facts of nature ; and, by bringing them to this test, exposed the falsehood of many of them. His successors have only had to contribute each his share in building up the new system ; he had also to overthrow the old one.

Mr. Boyle died, at the age of sixty-four, in 1691.

The experimental science of modern times never had a more devoted follower ; and he claims to be recorded, as having not only given us an illustrious example of the ardent pursuit of philosophy in a man of rank, but as having dedicated to its promotion the whole advantages of which his station and fortune put him in possession, with a zealous liberality that has scarcely been surpassed or equalled. Other wealthy patrons of literature and science have satisfied themselves with giving merely their money, and the *éclat* of their favourable regard, to the cause which they professed to take under their protection ; but he spent his life in the active service of philosophy, and was not more the encourager and supporter of all good works done in that name than a fellow-labourer with those who performed them. For the long period during which he was, in this country, the chief patron of science, he was also and equally its chief cultivator and extender. He gave to it not only his name, his influence, and his fortune, but his whole time, faculties, and exertions.

There is still one distinguished name connected with the more recent history of physical science in our own country, which we must not omit under our present head ;—we mean that of the late HENRY CAVENDISH. Mr. Cavendish was the son of Lord Charles Cavendish, brother of the third Duke of Devonshire, and was born in 1731. He was sent, when young, to a school, then of some celebrity, at Hackney, and afterwards went to Cambridge ; but it is believed that he derived his taste for science chiefly from his father, who was not only in the habit of amusing himself with philosophical experiments, but was a good mathematician, and is the author of some determinations with regard to the phenomena of the barometer, of considerable value and importance. Lord Charles Cavendish died at the age of eighty, in the year 1783, at which time he was the senior member of the Royal Society. His son had early shewn an attachment to scientific pursuits, to which, indeed, he had resolved to dedicate his life, and to sacrifice every other object of ambition, at a time when he had but

the prospect of a very moderate patrimony. It was only after he had passed his fortieth year that he came into the possession of his large fortune, which was unexpectedly left him by an uncle. He was admitted a Fellow of the Royal Society in 1760, and very soon began to distinguish himself as one of the most active members of that learned body. We cannot here attempt any detailed analysis of the papers with which he continued to enrich the Transactions for a period of nearly fifty years; suffice it to say, that they range over various departments of natural philosophy and chemistry, and are marked throughout by an accuracy, elegance, and often an originality of investigation, which make them models of scientific research and reasoning. Indeed, there are but few names of the last or present age, belonging to the departments which he cultivated, that are entitled to take precedence of that of Mr. Cavendish. Not to mention his important contributions to the theory of electricity, some of his experiments and determinations in pneumatic chemistry may be fairly ranked among the most brilliant discoveries of modern times. What is there, for example, more calculated to interest and astonish even the unscientific mind than his discovery of the composition of water—so long regarded by all as a perfectly simple element, if there was any such in nature? The manner, too, in which he made this discovery affords us a beautiful and instructive example of the right method of examining nature,—of that cautious and scrutinizing observation by which alone truth is to be detected. The experiments which led to it were made in the year 1781. Before this, the celebrated Swedish chemist, Scheele, had found that on mixing together and setting on fire certain proportions of oxygen gas, or that which forms the principal part of the atmosphere, and hydrogen, or, as it was then called, inflammable air, an explosion was produced, in which, as he imagined, the two elements were dissipated. Cavendish, however, in repeating the experiment, took care to provide himself with the means of watching the phenomena with more precision. For this purpose he ascer-

tained the weight of his two gases previous to their combination, and set them on fire in a close vessel, which was perfectly dry. The result was, that, after the explosion, a deposit remained in the vessel, which was found on examination to be water, and to be exactly equal in weight to the two gases. This experiment has since been repeated on a larger scale, with the same result; and water, on the other hand, has been decomposed into oxygen and hydrogen.

The great caution with which Mr. Cavendish conducted his inquiries was one of the most distinguishing characteristics of his method of procedure. To whatever subject he gave his attention, he examined it thoroughly. What we have just stated is well calculated to shew the value of such a habit in philosophy; for this great discovery, of itself enough to immortalize his name, would have eluded him as it had done Scheele, if he had not watched the experiment which revealed it more narrowly than that chemist. But it was not in this case only that the result of his investigations richly rewarded the care and circumspection with which they had been prosecuted. The patience with which he used to review and weigh all the circumstances of the case to be resolved has given a perfection to whatever he has done, from which as much benefit has resulted to the interests of science as to his own fame; for, instead of merely vague and imperfect indications, or hypotheses consisting half of truth and half of error, he has in this way bequeathed to philosophy either completed discoveries or investigations in which, so far as they go at least, there is no fallacy. He never, it has been remarked, advanced anything in any of his papers which he had afterwards to retract.

Although experimental science was Mr. Cavendish's favourite pursuit, and that on his success in which his fame rests, his stores of information upon other subjects were known to his friends to be various and extensive. Indeed, he spent his life, if any man ever did, in the pursuit of knowledge, making it his only amusement, as well as his only business. The simple and unexpensive habits of life which he had formed in his earlier years

underwent no change on his coming into possession of his large fortune. He had accustomed himself from his youth to the utmost regularity in all his movements; and his practice in this respect, to his last days, nothing was ever suffered to derange. What might be called his public scene was the Royal Society, the meetings of which he attended punctually as long as his strength permitted. With this exception, he was but little seen abroad; and, perhaps, the seclusion in which he lived made his name less popularly known in his own country than it would otherwise have been, notwithstanding his eminent merits. His fame, however, was more than British—it was European. On the Continent, where he was regarded without reference to his private habits and only as the author of many admirable scientific disquisitions and of some great discoveries, his name stood very high. The chief men of science in France gave the strongest proof of the estimation in which they held him, when, in 1803, they elected him one of the eight Foreign Associates of the Institute.

One valuable service which Mr. Cavendish's wealth enabled him to render to the students of science and literature of his time was the establishment of an extensive library, which, with great liberality and public spirit, he threw open for the accommodation both of his friends and of all other persons engaged in intellectual pursuits who were properly recommended to him—allowing them not only to consult the books, but to carry them home. In the use of this privilege he made no distinction between himself and the others whom he admitted to share it with him. When he wanted a book for his own perusal, the same application for it was made to the librarian, and the same receipt given for it, as if it had been borrowed by any other reader. Towards the close of his life, after the death of the person who had been accustomed to take charge of the collection, he even used to attend himself on a certain day of every week to give out the books to applicants.

This eminent person died in 1810, full of years and honours. Even in his last moments something of his love

of watching and scrutinizing the phenomena of nature shewed itself; he insisted upon being left to die alone, apparently that he might be able to observe the symptoms of approaching dissolution with the more undisturbed attention. Accordingly, when his servant, whom he had sent out of the room, returned sooner than he had desired, he immediately ordered him again to retire; and, when the man came back the second time, he found that his master had breathed his last. In his attachment to philosophy, Mr. Cavendish was all his life so independent of other sources of pleasure, that his fortune, rather possessed than enjoyed, and not expended in the maintenance of any of the shew and luxury in which a large revenue usually dissipates itself, had accumulated so greatly, that at the time of his death it is said to have amounted to twelve hundred thousand pounds. He may well be described, therefore, to have been, as a French writer has quaintly expressed it, the richest of all the learned of his time, as well as probably the most learned of all the rich.*

* M. Biot, in *Biographie Univ.* vii. 456.

CHAPTER XXVIII.

Other Individuals of rank distinguished in Literature and Science —
Marquess of Worcester, &c. Self-educated cultivators of Science —
Parkes; Davy.

THE preceding notices are abundantly sufficient to prove both how frequently men of wealth and rank have resisted all other allurements, to devote themselves to intellectual pursuits, and how many important contributions such persons have been enabled to make to literature, science, and the arts. Yet it would be easy to add to the list we have given, from a very cursory survey of the history of improvements and discoveries. Thus, to confine ourselves to the arts and sciences only, we might mention, among our own countrymen, the celebrated MARQUIS OF WORCESTER, author of the Hundred Inventions, among which we find the first suggestion of the steam engine; his contemporary, Viscount Brouncker, the first President of the Royal Society, and noted as the perfector of the theory of fractional arithmetic; the Earl of Macclesfield, to whom we are principally indebted for the reformation of the calendar, and the introduction of the new style into England; the late Lord Stanhope, the inventor of the printing press known by his name, as well as of many other most ingenious and valuable contrivances;—and various others, all memorable either as inventors, or as the authors of some decided step in the progress of improvement. Among foreigners, too, Prince Rupert, as already noticed, has been considered the discoverer of the art of mezzotinto engraving. Baron Hermelin, a nobleman of Sweden, who died in 1820, was the father of the modern and greatly improved system of working the mines of that country, which he expended many years of exertion and

large sums of money in introducing and establishing. The modern art of fortification is the creation of the French Marshal VAUBAN, a man of rank and wealth, who, although he spent his life as a soldier, found leisure to write numerous works, which have been printed, as well as twelve large volumes in manuscript which he left behind him, entitled '*Mes Oisivetés*,'—*My Idle Hours*. The most elaborate and splendid, though not the most correct work on Natural History that was ever written, and the one which, with all its errors, has, perhaps, more than any other, contributed to spread a taste for that science, was the production of another French nobleman, the celebrated Count de BUFFON. A German nobleman, the Baron von CANSTEIN, is noted for having discovered and practised at Halle, in the beginning of the last century, a new mode of printing, which appears to have been the same with that now called stereotype. This invention is singular for its vicissitudes of notoriety and oblivion. The Chinese have had a long acquaintance with the art of printing from blocks or plates, instead of moveable types, and among them it is to this day the only method in use. It was probably also the first form which the art of printing assumed in Europe,—was then forgotten for many years till it was revived in the middle of the sixteenth century at Augsburg, where some of the plates that were used for the purpose are still preserved,—was again introduced at Leyden about half a century later,—was a few years after re-invented by Canstein,—was practised at Edinburgh in 1744 by William Ged, who was quite ignorant of what had been done by his predecessors,—and, lastly, after his attempts had ceased to be remembered, was taken up anew by the late ingenious Dr. Alexander Tilloch, and Fowlis, the Glasgow printer, who, however, did little more than merely take out a patent for what they deemed their discovery. Stereotype printing is far from being universally applicable, and it is especially not suited to works which are likely to require extensive alterations in successive editions. If such works are largely corrected, the saving in the plates is in a great degree lost. If that

saving is principally regarded, and antiquated opinions or positive errors are multiplied through a paltry economy, the invention is a positive incumbrance to learning, and is therefore of little worth. Still, however, there are many cases in which it may be advantageously employed.

It ought to be observed, that the several block or plate-printers we have mentioned did not all pursue the same method. Faust, for instance, on the invention of printing, employed merely wooden blocks, such as are used by the Chinese, on which the characters were cut out, as is done still in wood-engraving; the Augsburg printers appear to have set up their types in the usual manner, and then to have converted them into a solid plate by pouring melted metal upon the back of the congeries; and the present method, as is well known, is, after having set up the types, to take an impression from them in plaster of Paris, or some other composition, and to cast or found the plate in this as a mould. It does not very clearly appear what was the plan which Canstein followed; but it is known that he printed a great many volumes and sold them very cheap. A copy of the New Testament, for instance, he used to sell for fourpence; but, as he was very pious, it is not improbable that he distributed the Scriptures at less even than the cost price, which his fortune enabled him to do. It is said that it was while endeavouring to devise a cheap method of multiplying copies of the Bible for the use of the poor, that the notion of his invention suggested itself to him.

Most of the individuals we have here mentioned, who, born to rank and affluence, have devoted themselves to scientific pursuits, were enabled to accomplish what they did, in a great measure, from the peculiar advantages of their position, which afforded them both leisure for the prosecution and maturing of their several schemes, and money to expend on the necessary apparatus and experiments. This proves to how much profit the rich man may turn his fortunate external circumstances, even in the pursuit of knowledge, if he can only rouse himself to enter with earnestness upon that enterprise. But still

the ambition of aspiring minds, left to struggle unassisted by such external aids, has accomplished, after all, quite as great things as all the resources and immunities of what might be deemed the happiest worldly lot have ever given birth to. We now return to accompany for a while the onward steps of a few more of those courageous adventurers who have begun and carried on the work of mental cultivation, without heeding any combination of worldly disadvantages against which they might have to contend. We shall begin with the cases of one or two individuals so situated, who have distinguished themselves in that same field of experimental science in which we have just seen what Boyle and Cavendish achieved in their very opposite circumstances.

The first name we shall mention is that of one who has no claim, we believe, to any important discovery in the department which he cultivated, but whose literary works, nevertheless, as well as his history, abundantly testify him to have been a most ingenious and meritorious man. We speak of the late Mr. SAMUEL PARKES, the well-known author of the 'Chemical Catechism.' Mr. Parkes, as we learn from a communication with which we have been favoured by his surviving daughter, was born in 1761, at Stourbridge, in Worcestershire, where his father was a small grocer. At five years of age he was sent to a preparatory school in his native town; and it is remembered that during the time of his attendance at this infant seminary, Mr. Kemble's company of itinerant players having visited Stourbridge and remained there for some months, that gentleman placed his daughter at the same school, the child who became afterwards the celebrated Mrs. Siddons. When ten years old, Parkes was sent to another school at Market-Harborough; but, after remaining here only a very short time, he was taken away and apprenticed to a grocer at Ross, in Herefordshire. This person happened to be a man of some education, and to be possessed of a few books, which he very kindly lent to his apprentice, and endeavoured to give him a taste for reading, but could not, it is said, gain much of his attention. It does not

appear how long young Parkes continued in this situation ; but at last his master failed, and he returned home to his father. We now hear no more of him till he had reached his thirty-second year, up to which time, it seems, he remained at home, assisting his father in the shop. It is probable, from the resources he afterwards displayed, that the foundation of many of his acquirements was laid during this interval. Perhaps he had also saved a little money ; for he now went to Stoke-upon-Trent, began business on his own account as a soap-boiler, and married. The new line upon which he entered shews that he had been already directing his attention to practical chemistry. But, after persevering for ten years in this business, he met with so little success as to be obliged to give it up ; and at the age of forty-two he came up to London with no property in the world except ten pounds, which had been lent him by his father. It was hard enough to be obliged, as it were, to begin the world again at this time of life ; but there was no help for it, and he set to work resolutely. Some friends whom he had made lent him a little assistance, and he began manufacturing muriatic acid for the use of dyers. It is very evident, that, although he had come to town without much money in his pocket, he had brought with him some useful knowledge—one fruit, at least, of the labours of his previous life, of which fortune had not been able to despoil him. This he now turned to excellent account. To his muriatic acid he soon added other chemical preparations, his skill in manufacturing which was not long in being generally appreciated, and eventually procured him a large trade and a high reputation.

Although Mr. Parkes had probably given considerable attention to some of the practical parts of chemistry before he came up to London, it was only after he had established himself in this last-mentioned line of business that he began to study the subject scientifically. At this time, as we have seen, he was above forty years of age—so that he may be quoted as another most encouraging example for those who have been prevented by any cause from commencing their studies till late in life.

Notwithstanding the time he had lost, Mr. Parkes became eventually a most accomplished chemist, and gave to the world a succession of works relating to that science which, ever since their publication, have held the rank of text-books of high authority. The earliest of these was his 'Chemical Catechism,' which first appeared in 1805, and of which numerous very large impressions have since been sold. It was translated, soon after its publication, into the German, French, Spanish, and Russian languages; and in Spain and Germany it is the standard manual of instruction in the public schools. By the sale of this work alone, the author realized 5000*l*. The Catechism was followed by another work, 'The Rudiments of Chemistry;' and that by the 'Chemical Essays,' in five volumes. This last, in particular, of which a new edition appeared a few years ago, is an excellent performance, and strikingly shews the author's extensive acquaintance with his subject. Like their precursor, these two works were also translated into the principal continental languages, and obtained great popularity abroad, as well as in this country. Among other gratifying testimonies which the author received of the sense entertained of his labours, was a splendid ring presented to him for his services to science by the Emperor of Russia.

One of the chief merits of the elementary works published by Mr. Parkes, and what must doubtless more than anything else have helped to make them popular, lies in this; that in all his explanations the author begins at the beginning and nowhere assumes any information necessary for understanding the subject to exist in the mind of the reader beyond what he has himself communicated. It might seem, at first sight, as if this were a part of the art of teaching of no very difficult attainment. Yet the fact is, that it is a secret of which very few writers have made themselves masters. In general, the person who resorts to a professedly elementary treatise, in order to study any branch of science of which he previously knows nothing, finds himself stopped before he has gone very far, by the author paying him the very inconvenient compliment of addressing him as if he were

amiliar with many things of which he is quite ignorant. Hence, more than on any other account, the uselessness, or at least the insufficiency, of the greater number of such works for the end which they are intended to serve. They almost always suppose the reader to know, before he opens them, no inconsiderable part of the very mystery which they profess to teach. It sometimes, no doubt, happens that the reader does accidentally possess this requisite preliminary information; and then (though no thanks to the author) he will make his way through the book without being inconvenienced by its deficiencies. In other cases he may have sufficient ingenuity to deduce from what is stated some conjecture more or less vague as to what is passed over, and in this way may be enabled to proceed in his perusal without finding himself absolutely in the dark. But his progress so conducted, is not only slow, unsatisfactory, and painful, compared to what it might be, but is likely besides to leave him at last only half-informed or misinformed as to many things which he supposes himself to know. Perhaps the best way of employing books of the description to which we allude—when no better are to be had—is for the student to provide himself with two or more at the same time upon the subject of which he wishes to make himself master; so that when he finds one deficient or unintelligible, he may have a chance of finding an interpreter in another. This is a method which has sometimes been successfully followed by persons who have been obliged to be their own instructors, after every attempt to understand the science, or other branch of education, which it was desired to learn by the assistance of a single author, had proved a failure; and we recommend it to others similarly situated. The probability is, that, of two writers each of whom at times expresses himself obscurely, the one will not always or usually fall into that fault in regard to exactly the same matters as the other; and, therefore, though either alone might be an inadequate instructor, the two together may shed sufficient light on the subject. Besides, of two or more ways of presenting or illustrating the same truth, one mind is

most readily reached by one, and another by another ; so that, even when no absolute insufficiency can fairly be complained of in either treatise, the two are still better than one. The force of this last consideration has induced some popular writers of elementary works to state the more difficult parts of their subject in a variety of ways for the sake of more surely impressing them upon the various minds, or moods of mind, they may chance to address ; and the practice, when followed judiciously, and so as not to overload the book with unnecessary repetitions, a course which only fatigues the reader and distracts his attention, is one which may be made greatly to contribute to the clear and effective exposition of the author's meaning.

It may seem strange that so many writers should have failed in the observance of a rule of elementary explanation apparently so simple and easy as that in question. What less difficult, it may be said, or even more natural, than, in expounding any subject to a mind which is supposed to be ignorant of its first principles, to state everything with a recollection of, and in accommodation to, that ignorance ? It is only, in the first place, to deduce the introductory statements from sufficiently familiar instances, and then, in pursuing the line of inference or demonstration, to advance from one thing to another by sufficiently short steps. But even to do this requires no common degree of attention, patience, and skill. It is true that all science, even the highest and most recondite, is deducible from the facts or feelings of ordinary life ; but it often happens that a proficient in a particular science has never viewed it in this connexion. The manner in which he was himself taught it did not lead him to do so. He was probably carried through what were called its principles, by an exercise of his faith rather than of his reason ; and left to gather a full understanding of them, not so much from what he knew of their foundations before, as from what he was to see of their application afterwards. He was like a man entering a half-darkened apartment to whom everything is at first invisible, and who is indebted for the measure of

discernment which at last enables him in some sort to distinguish objects, not to any additional light which is thrown upon them from without, but to the expansion of eye which the dimness itself occasions. It may happen that, in the progress of his studies, his partial acquaintance with one part of the subject has so much aided his partial acquaintance with another part, that he has at last attained to a tolerably clear notion of the whole. But still it remains in his head an insulated system of propositions, altogether withdrawn and separated from those truths of ordinary experience out of which, nevertheless, it has wholly sprung. When a person, therefore, who has acquired his knowledge in this manner sits down to write an elementary book, he will be very apt to overlook that connexion between scientific and common truths to which his own attention has never been called. He will begin his treatise, not by reference to something which is understood by everybody, but by an announcement so far ahead of everything of this kind, that its meaning is likely to be nearly imperceptible to all except those who have already some acquaintance with the still more remote matters to which it is intended to lead. And his subsequent deductions will all be apt to be characterized by the same absence of the simple and the natural, proceeding as they do from a mind which did not acquire its own knowledge of the subject from contemplating it in its simplest and most natural aspect.

Now, a self-educated man, when he attempts to explain to others what he has himself learned, is much less likely to fall into this error of manner. His own earliest acquaintance with science was probably made by the aid of that unscientific knowledge which common observation teaches every man; and having no master to supply the deficiencies of his books, he must have felt painfully the inconvenience of their omissions and obscurities. Hence, in his own performances springs a method and style of address in all respects better suited to readers circumstanced as he himself was. He knows, from his own experience, what the difficulties of such readers are, and

is therefore both the more solicitous and the better qualified to provide against them. In making his first approach to the science, he does it through the avenue of certain common and simple facts, calculated to carry with them the apprehension and assent of all ; his references are frequent throughout the work to considerations of this class, which are always a valuable excitement and help to the mind ; and his progress from one statement to another is marked by a happy skill in so selecting and arranging the intermediate points of notice, or, as we may express it, choosing his steps, as to arrive at the ultimate object at once by the easiest and the shortest road. For it is of importance to remark, that the secret of this art of perspicuous explanation does not lie so much in an exuberant minuteness of detail, which leaves no particular whatever unstated, as in bringing out from the group, and fixing the chief attention on, those comparatively few particulars which, being themselves apprehended, suggest and supply the rest. A prolix and indiscriminating enumeration of all the items of the case is rather adverse to a clear and effective exposition, tending as it does both to weary and confuse the mind. To make the description what it should be, nothing needful should be omitted, and there should be nothing superfluous.

The elementary treatises of Mr. Parkes possess, as we have said, a good deal of this sort of merit, and owe to that circumstance much of their popularity and usefulness. Those of Ferguson, another self-educated individual, display the same excellence in a still greater degree, and have always, accordingly, been favourites of those students of science who, like the writer, have been their own instructors. We may here observe, however, that the advantages of the question and answer method pursued in the 'Chemical Catechism' may reasonably be doubted. Where the composition assumes the form of a dialogue or conversation, in which two or more speakers are made, as it were, to examine or discuss the subject, one proposing his doubts or difficulties, which another meets and solves by the proper reasons and explanations, as well exemplified, for instance, in some of

Mrs. Marcet's treatises, the meaning and convenience of so breaking down the statements are sufficiently obvious. The attention of young readers especially is, perhaps, better kept alive by such an intermixture of the dramatic; and the artifice is also an ingenious one for enabling the author to notice and correct, in the most natural manner, the various misapprehensions into which the mind is apt to fall on first attempting to make acquaintance with a new subject. But neither of these purposes seems to be, in any degree, answered by merely introducing every sentence or short paragraph throughout the work with a formal interrogatory. Even in a mere school-book, the pupil's ingenuity is best exercised, and his understanding of what he reads most effectually ensured, by the questions he should be able to answer being left to be put to him by his teacher, and the answers themselves to be given in his own words. The other plan would seem to be calculated only to assist the pupil in learning his task by rote.

Mr. Parkes, in his latter and more prosperous days, used often to dwell with pleasure on his struggles in early life, and naturally felt proud of relating the hardships he had surmounted by his own industry. The success of the different works he published gave him, as might be supposed, the highest gratification. In addition to the literary performances which we have already mentioned, we ought to notice two pamphlets which he gave to the public in the years 1817 and 1819, in support of the attempt then making, and which was eventually successful, to obtain a repeal of the salt duties. He was one of the most active of the persons who stirred in this matter, anticipating, as it has been already noticed that the celebrated inventor of the Logarithms appears to have done, great advantages to agriculture from the use of salt as a manure. Engaged, as he was, in the management of an extensive chemical manufactory, which required unremitting attention, his hours of literary labour were those which he stole from repose or from the time which most men give to relaxation and amusement. Yet, besides the different books which, in the course of a few years, he published in his

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own name, he wrote also numerous papers for the different scientific periodical works of the day. As another evidence, too, of his punctuality and indefatigable industry, it may be mentioned that he had, from an early age, been in the habit of keeping a regular diary of every action of his life, and never retired to bed till he had committed to writing the events of the day. This, and all his other industrious habits, he kept up to the last; and, even up to within a few days of his death, although he had long been suffering under a painful disease, his attention to business, and especially to his scientific pursuits, continued unrelaxed. He closed his valuable and active life on the 23rd of December, 1825, in the sixty-fifth year of his age.

Neither the acquisition of knowledge, nor that of wealth, then, need be despaired of even by those who have not succeeded in accumulating much of either after a large portion of life has been spent, provided they still resolve to exercise industry and perseverance during the remainder of it. These virtues seldom fail to obtain their natural recompense at last; although, in some cases, they may have to struggle for a long time with circumstances very unfavourable to success. A man is sometimes so unfortunately placed, so jammed in and hand-bound by the pressure of an unpropitious lot, that, with his best efforts, it is long before he can extricate himself and obtain even a fair opportunity of exerting what powers he may possess. This seems to have been the case with Parkes for the first forty years of his life. In the popular phrase, fortune was set against him; he either had no means of engaging in any likely line of well-doing, or whatever he attempted turned out unsuccessful. But, in such a shifting scene as this world is, it can rarely happen that a man shall, during the whole of his life-time, have the blast against him. As the poet expresses it, "there is a *tide* in the affairs of men," an ebbing and flowing of the unstable element on which they are borne, and if this be only "taken at the flood," the "full sea" is gained on which "the voyage of their life" may be made with ease and the prospect of a happy

issue. It is only those, however, who are constantly on the watch for it that will be prepared to seize the lucky moment when it comes; in other words, nothing but the cultivation and continued exercise of habits of industry and perseverance, even while they bring but small or no immediate return, will enable a man to benefit by the most favourable opportunities when they at last present themselves. To the habitually indolent and thoughtless it is the same as if the tide never were at flood at all—for they are sure to miss it when it is. Parkes spent nearly two-thirds of his life in contending with difficulties, which baffled all his attempts to overcome them; and others may, sometimes, be for as long a period equally unfortunate. Let such be taught, by his history, that their sky may yet brighten; and, by his example, how to take advantage of it when it does. The space of life that remained to him after his more prosperous career began was comparatively short; but it was long enough to enable him, while he gave the most assiduous attention to business, not only to acquire much knowledge himself, but also to contribute largely to its diffusion in his own and other countries; and to secure, by his literary works, a highly respectable place among the scientific writers of the time.

But the annals of modern Chemistry supply us with a much more splendid name among the self-taught cultivators of the science. The discoveries of all his predecessors have been, in our own day, surpassed in brilliancy by those of Sir HUMPHREY DAVY. Davy was born in 1778, at Penzance, in Cornwall. His father followed the profession of a carver in wood in that town, where many of his performances are still to be seen in the houses of the inhabitants. All that we are told of Davy's school education is, that he was taught the rudiments of classical learning at a seminary in Truro. He was then placed by his father with an apothecary and surgeon in his native place. But, instead of attending to his profession, he spent his time either in rambling about the country or in experimenting in his master's garret, sometimes to the no small danger of the whole establish-

ment; and the doctor and he at last agreed to part. About his fifteenth year he was placed as pupil with another surgeon residing at Penzance; but it does not appear that his second master had much more success than his first in attempting to give him a liking for the medical profession. The future philosopher, however, had already begun to devote himself, of his own accord, to those sciences in which he afterwards so greatly distinguished himself; and, proceeding upon a plan of study which he had laid down for himself, he had, by the time he was eighteen, obtained a thorough knowledge of the rudiments of natural philosophy and chemistry, as well as made some proficiency in botany, anatomy, and geometry. The subject of metaphysics, it is stated, was also embraced in his reading at this period.

But chemistry was the science to which, of all others, he gave himself with the greatest ardour; and, even in this early stage of his researches, he seems to have looked forward to fame from his labours in this department. The writer of the memoir of Sir Humphrey to which we are indebted for these particulars,* quotes an exclamation which broke from him one day in after-life, when contemplating, along with a friend, a picture of one of the mines of his native district, which shews what were the visions of his solitary rambles. "How often, when a boy," said he, "have I wandered about those rocks in search after new minerals, and, when tired, sat down upon those crags, and exercised my fancy in anticipations of future renown!" The peculiar features of this part of the country doubtless contributed not a little to give his genius the direction it took. The mineral riches concealed under the soil formed alone a world of curious investigation. The rocky coast presented a geological study of inexhaustible interest. Even the various productions cast ashore by the sea were continually affording new materials of examination to his inquisitive and reflecting mind. The first original experiment, it is related, in which he engaged, had for its object to ascertain

Originally published in the 'Spectator' newspaper.

the nature of the air contained in the bladders of seaweed. At this time, he had no other laboratory than what he contrived to furnish for himself, by the assistance of his master's phials and gallipots, the pots and pans used in the kitchen, and such other utensils as accident threw in his way. These he converted, with great ingenuity, to his own purposes. On one occasion, however, he accounted himself particularly fortunate in a prize which



Sir Humphrey Davy.

he made. This was a case of surgical instruments with which he was presented by the surgeon of a French vessel that had been wrecked on the coast, to whom he had done some kind offices. Examining his treasure with eagerness, Davy soon perceived the valuable aid he might derive in his philosophical experiments from some of the articles; and one of the principal of them was, in no long time, converted into a tolerable air-pump. The

proper use of the instruments was, of course, as little thought of by their new possessor as that of his master's gallipots was wont to be when he had got them up to his garret. Davy's subsequent success as an experimentalist, it is well remarked by the writer to whom we have referred above, was probably owing, in no small degree, to the necessity he was placed under in his earliest researches of exercising his skill and ingenuity in this fashion. "Had he," proceeds his biographer, "in the commencement of his career been furnished with all those appliances which he enjoyed at a later period, it is more than probable that he might never have acquired that wonderful tact of manipulation, that ability of suggesting expedients, and of contriving apparatus so as to meet and surmount the difficulties which must constantly arise during the progress of the philosopher through the unbeaten tracks and unexplored regions of science. In this art Davy certainly stands unrivalled; and, like his prototype, Scheele, he was unquestionably indebted for his address to the circumstances which have been alluded to: there never, perhaps, was a more striking exemplification of the adage, that necessity is the parent of invention."

A curious catalogue might be made of the shifts to which ingenious students in different departments of art have resorted, when, like Davy, they have wanted the proper instruments for carrying on their inquiries or experiments. His is not the first case in which the stores of an apothecary's shop are recorded to have fed the enthusiasm and materially assisted the labours of the young cultivator of natural science. The German chemist, Scheele, who has just been mentioned, and whose name ranks in his own department with the greatest of his time, was, as well as Davy, apprenticed in early life to an apothecary. While living in his master's house he used secretly to prosecute the study of his favourite science by employing often half the night in reading the works that treated of it, or making experiments with instruments fabricated, as Davy's were, by himself, and out of equally simple materials. Like the young British

philosopher, too, Scheele is recorded to have sometimes alarmed the whole household by his detonations ;—an incident which always brought down upon him the severe anger of his master, and heavy menaces intended to deter him from ever again applying himself to such dangerous studies, which, however, he did not long regard. It was at an apothecary's house, as has been noticed in a preceding page, that Boyle and his Oxford friends first held their scientific meetings, induced, as we are expressly told, by the opportunity they would thus have of obtaining drugs wherewith to make their experiments. Newton lodged with an apothecary, while at school, in the town of Grantham ; and as, even at that early age, he is known to have been ardently devoted to scientific contrivances and experiments, and to have been in the habit of converting all sorts of articles into auxiliaries in his favourite pursuits, it is not probable that the various strange preparations which filled the shelves and boxes of his landlord's shop would escape his curious examination. Although Newton's glory chiefly depends upon his discoveries in abstract and mechanical science, some of his speculations, and especially some of his writings on the subjects of light and colour, shew that the internal constitution of matter and its chemical properties had also much occupied his thoughts. Thus, too, in other departments, genius has found its sufficient materials and instruments in the humblest and most common articles, and the simplest contrivances. Ferguson observed the places of the stars by means of a thread with a few beads strung on it, and Tycho Brahe did the same thing with a pair of compasses. The self-taught American philosopher, Rittenhouse, being, when a young man, employed as an agricultural labourer, used to draw geometrical diagrams on his plough, and study them as he turned up the furrow. Pascal, when a mere boy, made himself master of many of the elementary propositions of geometry without the assistance of any master, by tracing the figures on the floor of his room with a bit of coal. This, or a stick burned at the end, has often been the young painter's first pencil, while the smoothest and

whitest wall he could find supplied the place of a canvass. Such, for example, were the commencing essays of the early Tuscan artist, Andrea del Castagno, who employed his leisure in this way when he was a little boy tending cattle, till his performances at last attracted the notice of one of the Medici family, who placed him under a proper master. The famous Salvator Rosa first displayed his genius for design in the same manner. To these instances may be added that of the late English musical composer Mr. John Davy, who is said, when only six years old, to have begun the study and practice of his art by imitating the chimes of a neighbouring church with eight horse-shoes, which he suspended by strings from the ceiling of a room in such a manner as to form an octave.*

But to return to the subject of our notice. Davy first pursued his chemical studies, without teacher or guide, in the manner that has been described, and aided only by the scantiest and rudest apparatus. When still a lad, however, he was fortunate in making the acquaintance of Mr. Gregory Watt, the son of the celebrated James Watt. This gentleman, having come to reside at Penzance for the recovery of his health, lodged with Mrs. Davy, and soon discovered the talent of her son. The scientific knowledge of Mr. Watt gave an accurate direction to the studies of the young chemist, and excited him to a systematic perseverance in his favourite pursuit. Chance attracted to him the notice of Mr. Davies Giddy (afterwards Mr. Gilbert, and President of the Royal Society), which the discovery of his merits soon improved

* There is an excellent little work by a German writer, Campe, entitled *The New Robinson*, which, in an account of the various expedients supposed to be resorted to by a young seaman cast ashore on an uninhabited island, and obliged to provide for himself sustenance and shelter by the aid merely of such implements as he could fashion by his own ingenuity, presents a very interesting picture of the manner in which many of the ordinary processes of mechanical art might be performed without the ordinary tools. The work has been translated into English.

into patronage and friendship. The boy, we are told, was leaning on the gate of his father's house when Mr. Gilbert passed accompanied by some friends, one of whom remarked that there was young Davy, who was so much attached to chemistry. The mention of chemistry immediately fixed Mr. Gilbert's attention; he entered into conversation with the young man, and, speedily becoming convinced of his extraordinary talents and acquirements, offered him the use of his library, and whatever other assistance he might require for the pursuit of his studies. Mr. Gilbert and Mr. Watt soon after this introduced Davy to the celebrated Dr. Beddoes, who had just established at Bristol what he called his Pneumatic Institution, for investigating the medical properties of the different gases. Davy, who was now in his nineteenth year, had for some time been thinking of proceeding to Edinburgh, in order to pursue a regular course of medical education; but Dr. Beddoes, who had been greatly struck by different proofs he had given of his talents, and especially by an essay in which he propounded an original theory of light and heat, having offered him the superintendence of his new institution, he at once closed with that proposal.

The young philosopher was now fairly entered on his proper path, and, from this period, we may consider him as having escaped from the disadvantages of his early lot. But it was while yet poor and unknown that he had made those acquirements which both obtained for him the notice of his present patrons, and fitted him for the situation in which they placed him. His having attracted the attention of Mr. Gilbert, as he stood at his father's gate, may be called a fortunate incident; but it was one that never would have happened had it not been for the proficiency he had already made in science by his own endeavours. Chance may be said to have offered this opportunity of emerging from obscurity; but, had he not previously laboured in the cultivation of his mind as he had done, it would to him have been no opportunity at all.

The experiments conducted by Davy, and under his

direction, at the Bristol Institution, were soon rewarded by important results ; and of these, Davy, when he had just completed his twenty-first year, published an account, under the title of ' *Researches, Chemical and Philosophical, chiefly concerning Nitrous Oxide, and its respiration.*' In this publication the singularly intoxicating effects produced by the breathing of nitrous oxide were first announced ; and it excited a considerable sensation in the scientific world, and at once made Davy generally known as a most ingenious and philosophic experimentalist. He was, in consequence, soon after its appearance, invited to fill the chemical chair of the Royal Institution, then newly established. When he commenced his lectures here, he was scarcely twenty-two years of age ; but never was success in such an attempt more decided and brilliant. He soon saw his lecture-rooms crowded, day after day, by all that was most distinguished in the rank and intellect of the metropolis ; and his striking and beautiful elucidations of every subject that came under his review riveted, often even to breathlessness, the attention of his splendid auditory. The year after his appointment to this situation he was elected also Professor of Chemistry to the Board of Agriculture ; and he greatly distinguished himself by the lectures which, for ten successive sessions, he delivered in this character. They were published in 1813 at the request of the Board.* In 1803, when only in his twenty-fifth year, Davy was elected a Fellow of the Royal Society, and his contributions to the Transactions, from this time till his death, were frequent, and of the highest value. In 1806 he was chosen to deliver the Bakerian lecture before the Society ; and he performed the same task for several successive years. Many of his most brilliant discoveries were announced in these discourses. In 1812 he received the honour of knighthood from the Prince Regent, being the first person on whom his Royal Highness conferred

* A new edition of these Lectures, with copious annotations, bringing them up to the knowledge of the present day, has just been published by Professor Shier of Aberdeen.

that dignity : and two days after he married a lady who brought him a considerable fortune. Next year he was elected a corresponding member of the French Institute. He was created a baronet in 1818. In 1820 he was chosen a foreign associate of the Royal Academy of Sciences at Paris, on the death of the illustrious Watt. He had been for some time secretary to the Royal Society ; and in 1820, on the death of Sir Joseph Banks, he was, by a unanimous vote, raised to the Presidency of that learned body—an office which he held till he was obliged to retire, from ill health, in 1827, when his friend and first patron, Mr. Gilbert, was chosen to succeed him. Little, we may suppose, did either of the two anticipate, when they first met, thirty years before, at the gate of Davy's father's house, that they would thus stand successively, and in this order, at the head of the most distinguished scientific association in England.

It is impossible for us in this place to attempt anything more than the most general sketch of Sir Humphrey Davy's numerous and most important discoveries in chemical science. Even his earliest publication, the title of which we have already transcribed, was regarded as, for the first time, introducing light and order into an interesting department of the science,—the theory of the various combinations of oxygen and nitrogen, the two gases which, mixed together in certain proportions, form our common atmospheric air, but in other proportions produce compounds of an altogether dissimilar character. The first memoir by Davy which was read before the Royal Society was presented by him in 1801, before he was a member. It announced a new theory, which is now generally received, of the galvanic influence, or the extraordinary effect produced by two metals in contact with each other, when applied to the muscle even of a dead animal, which the Italian professor, Galvani, had some years before accidentally discovered. It was supposed both by Galvani and his countryman Volta, who also distinguished himself in the investigation of this curious subject, that the effect in question was an electrical phenomenon—whence galvanism used to be called animal

electricity ; but Davy shewed, by many ingenious experiments, that, in order to produce it, the metals in fact underwent certain chemical changes. Indeed, he proved that the effect followed when only one metal was employed, provided the requisite chemical change was by any means brought about on it, as, for example, by the interposition between two plates of it of a fluid calculated to act upon its surface in a certain manner. In his Bakerian lecture for 1806, he carried the examination of this subject to a much greater length, and astonished the scientific world by the announcement of a multitude of the most extraordinary results, from the application of the galvanic energy to the composition and decomposition of various chemical substances. From these experiments he arrived at the conclusion, that the power called chemical affinity was, in truth, identical with that of electricity. Hence the creation of a new science, now commonly known by the name of Electro-Chemistry, being that which regards the supposed action of electricity in the production of chemical changes. The discourse in which these discoveries were unfolded was crowned by the French Institute with their first prize, by a decision which reflects immortal honour upon that illustrious body ; who thus forgot not only all feelings of national jealousy, but even the peculiar and extraordinary hostility produced by the war which then raged between the two countries, in their admiration of genius and their zeal for the interests of philosophy.

But the results which this great chemist had already obtained only formed, in his hands, the source of new discoveries. In the interesting and extraordinary nature of its announcements, the Bakerian lecture of 1807 was as splendid a production as that of the former year. There are certain substances, as the reader is aware, known in chemistry by the name of alkalis, of which potash and soda are the principal. These substances chemists had hitherto in vain exhausted their ingenuity, and the resources of their art, in endeavouring to decompose. The only substance possessing alkaline properties, the composition of which had been ascertained, was am-

monia, which is a gas, and is therefore called volatile alkali; and, this having been found to be a compound of certain proportions of hydrogen and nitrogen, an opinion generally prevailed that hydrogen would be found to be also a chief ingredient of the *fixed* alkalis. Davy determined, if possible, to ascertain this point, and engaged in the investigation with great hopes of success, from the surpassing powers of decomposition which he had found to belong to his new agent, the galvanic influence. The manner in which he pursued this object is one of the most beautiful specimens of scientific investigation on record. One of the most important of the laws of galvanic decomposition, which he had previously discovered, was, that, when any substance was subjected to this species of action, its oxygen (an ingredient which nearly all substances contain) was developed at what is called the positive end or pole of the current of electricity, while, whenever any hydrogen or inflammable matter was present, it uniformly appeared at the opposite or negative pole. Proceeding upon this principle, therefore, Davy set to work with a fixed alkali; and at first submitted it dissolved in water to the galvanic action. The result, however, was, that the water alone was decomposed, nothing being disengaged by the experiment but oxygen and hydrogen, the ingredients of that fluid, which passed off as usual, the former at the positive, the latter at the negative pole. In his subsequent experiments, therefore, Davy proceeded without water, employing potash in a state of fusion; and, having guarded the process from every other disturbing cause that presented itself, by a variety of ingenious arrangements, he had at last the satisfaction of seeing the oxygen gas developed, as before, at the positively electrified surface of the alkali, while at the same time, on the other side, small globules of matter were disengaged, having all the appearances of a metal. The long agitated question was now determined; the base of the fixed alkalis was clearly metallic. To ascertain the qualities of the metallic residue which he had thus obtained from the potash, was Davy's next object. From its great attraction for oxygen,

it almost immediately, when exposed to the atmosphere, became an alkali again, by uniting with that ingredient; and at first it seemed on this account hardly possible to obtain a sufficient quantity of it for examination. But at last Davy thought of pouring over it a thin coating of the mineral fluid called naphtha, which both preserved it from communication with the air, and, being transparent, allowed it to be examined.

We have thus rapidly sketched the course of these brilliant and successful experiments, because they form a most interesting and instructive exemplification of the manner in which knowledge is pursued, and the secrets of nature extorted from her, by well-directed interrogation. The business of philosophic experiment, it may be well to observe, is not a mere random expenditure of tests and applications. The true disciple of the inductive philosophy, on the contrary, has always in his contemplation, while conducting his experiments, an idea or end which he aims at realizing, and which, in fact, directs him to every experiment to which he resorts. Thus, in the present instance, the idea in Davy's mind was, that the alkali was compounded of two ingredients which had severally an attraction for the two opposite poles of the electric current. This idea he never lost sight of throughout the whole course of his experiments, though he repeatedly shifted his ground in regard to the contrivances by which he sought its proof and manifestation. To proceed in any other way would not be to philosophize, but merely, as it were, to dip the hand into the bag of chance in quest of a discovery, as men draw prizes at a lottery. It is true that, until the experiment has confirmed or refuted his expectations, this guiding idea upon which the experimenter proceeds must be regarded merely as a conjecture. But such a conjecture or hypothesis he must have in his mind, or he is in no condition to set about the inquisition of nature. What progress would the conductor of a trial in a court of justice be likely to make, in questioning a witness, without some previous notion of the truth which the evidence was likely to establish? He might waste the whole day in putting questions and

receiving answers, and at last have ascertained nothing. Just as unprofitably would the interrogator of nature spend his time, if he had no directing anticipation in every case, according to which to order his experiments. Accident might, it is possible, throw a discovery in his way ; but his own occupation would be evidently as idle and as little that of a philosopher as the rattling of a dice-box. *Whenever, indeed, a discovery is made without being anticipated, we say that it has been made by chance.* On the other hand, the history of all discoveries that have been arrived at by what can with any propriety be called philosophical investigation and induction, attests that necessity which has been asserted of the experimenter proceeding in the institution and management of his experiments upon a previous idea of the truth to be evolved. This previous idea is what is properly called a *hypothesis*, which means something *placed under* as a foundation or platform on which to institute and carry on the process of investigation. A *theory* is a completed view of a harmonious system of truths, evolved and proved by calculation or induction. As the latter is the necessary completion of every philosophical inquiry, so the former is its equally indispensable beginning. It is the aim in the mind of the philosopher, without which he cannot philosophize. It makes, in short, the main difference between the experiments of the philosopher in his laboratory, and those of the child among its playthings. Of course, however, every hypothesis must give way before an experiment the result of which cannot be reconciled with it. Newton, in proceeding to investigate the system of the heavens, set out on the hypothesis that the same power of gravitation which made a stone fall to the ground would be found to retain the moon and the planets in their orbits around the earth and the sun. The result of his first calculation was unfavourable to this supposition, and he at once abandoned it. We have here an example both of the use of an hypothesis, and of the proper limits of reliance on it. The grand discovery which eventually resulted from Newton's investigations affords us, again,

an illustration of the manner in which an hypothesis serves to lead to, and originate a theory.*

The metal which Sir Humphrey Davy obtained from potash he called *Potassium*; and from soda he also, by a similar process, obtained another, which he called *Sodium*. Both these new metals he found to possess several curious properties, which, however, we cannot stop here to enumerate. He afterwards decomposed also the different earths, and shewed them to be all, as well as the alkalis, compounds of oxygen with a metallic base. But these important discoveries, which may be said to have revolutionized the science of chemistry, were not the only results which he obtained from his galvanic and electrical experiments. The interesting subject of the connexion between electricity and magnetism received considerable elucidation from his researches. For an account of his contributions to this branch of science, we must refer to the able memoir we have already mentioned, or to his papers on the magnetic phenomena produced by electricity, in the *Philosophical Transactions*.†

Meanwhile his attention had been attracted to another subject of the greatest practical importance—the possibility of preventing the destructive explosions in coal-mines occasioned by the fire-damp, or inflammable gas, which is found in many parts of them. By a series of experiments Davy found that this dangerous gas, which was known to be nothing more than the hydrogen of the chemists, had its explosive tendencies very much restrained by being mixed with a small quantity of carbonic acid and nitrogen, (the ingredient which, along with oxygen, forms atmospheric air); and that, moreover, if it did explode when so mixed, the explosion would not pass through apertures less than one-seventh of an inch in diameter. Proceeding, therefore, upon these ascertained facts, he contrived his celebrated *Safety Lamp*.

* See this subject admirably treated in the Preliminary Discourse to the *Encyclopædia Metropolitana*.

† *Philosophical Transactions* for 1819.

It consists of a small light, fixed in a cylindrical vessel, which is every where air-tight, except in the bottom, which is formed of fine wire gauze ; and in the upper part, where there is a chimney for carrying off the foul air. The air admitted through the gauze suffices to keep up the flame ; which, in its combustion, produces enough of carbonic acid and nitrogen to prevent the fire-damp, when inflamed within the cylinder, from communicating the explosion to what is without. The heretofore destructive element, thus caught and detained, is therefore not only rendered harmless, but actually itself helps to furnish the miner with light, the whole of the interior of the cylinder being filled with a steady green flame, arising from the combustion of the hydrogen, which has been admitted to contact with the heat, but cannot carry back the inflammation it has received to the general volume without. Armed with this admirable protection, therefore, the miner advances without risk, and with sufficient light to enable him to work into recesses which formerly he could not have dared to enter. The safety lamp has already been the means of saving many lives, and has enabled extensive mines, or portions of mines, to be wrought, which, but for its assistance, must have remained unproductive.* The coal-owners of the northern districts invited Sir Humphrey, in 1817, to a public dinner, and presented him with a service of plate of the value of 2000*l.*, in testimony of what they felt to be the merit of this invention.

We will mention only another of this eminent individual's ingenious practical applications of those scientific truths with which he enriched the philosophy of his age. About the year 1823, the attention of the Commissioners of the Navy was so strongly excited to the fact of the rapid decay of the copper sheathings of ships when exposed to the action of the salt-water, that they applied to the Royal Society to take the subject into consideration, and endeavour to devise a remedy for the evil.

* See Report of Committee of the House of Commons on the Coal Trade (1829).

On this occasion, Davy again had recourse to those principles of electro-chemistry, of which he had himself been the discoverer, and by the application of which he had already obtained so many brilliant results. One of the laws of electrical agency which he considered himself to have ascertained, was that two substances can only combine by what is called chemical affinity or attraction when they are in opposite electrical states,—that is to say, when the one is positively, and the other negatively, electrified. The copper and the water, therefore, he concluded, were naturally in these circumstances; and all that would be required, consequently, to prevent the action of the one upon the other, would be to change the electrical condition of that one of them, namely the copper, which it was possible to submit to the necessary treatment. He thought of various ways of effecting this object; but, at last, he determined to try the effect of merely placing a quantity of zinc or iron in contact with the copper; the former metals being more positive than the latter, and therefore fitted by induction to repel a portion of its electricity, and so to render it negative like the water.* The result surpassed his expectations. So powerfully did the one metal act in reversing the electrical state of the other, that a bit of zinc or iron, no larger than a pea, was found sufficient to protect from corrosion forty or fifty square inches of copper. Nothing, therefore, could be more perfect than the success of this contrivance for the particular purpose it was intended to serve. But, unfortunately, it has been found by experience, that, although Davy's method completely answers for preventing the wasting of the copper, the sea-weeds and marine insects accumulate in such quantities upon the bottoms of ships so protected, that they become, after a short time, scarcely navigable. For the present, therefore, the use of the zinc and iron is of necessity abandoned. It is by no means improbable, however, that some expedient may be contrived for counteracting this consequence of the application of Davy's invention—in

* See vol. i. p. 235.

which case it will be entitled to rank as one of the most valuable discoveries ever made.

We have thus, guided chiefly by the Memoir of which mention has been made above, pursued the principal triumphs of Sir Humphrey's splendid career, and described what he achieved, although cursorily and briefly, in such a manner, we trust, as to put even the unscientific reader in possession of a tolerably just view of the great discoveries on which his fame rests. In 1827, as we have already mentioned, his health had become so bad, that he found it necessary to resign the presidency of the Royal Society. Immediately after this he proceeded to the Continent. During his absence from England, he still continued to prosecute his chemical researches, the results of which he communicated in several papers to the Royal Society. He also, notwithstanding his increasing weakness and sufferings, employed his leisure in literary composition on other subjects, an evidence of which appeared in his 'Salmonia,' a treatise on fly-fishing, which he published in 1828. This little book is full of just and pleasing descriptions of some of the phenomena of nature, and is imbued with an amiable and contented spirit. His active mind, indeed, continued, it would seem, to exert itself to the last almost with as unwearied ardour as ever. Beside the volume we have just mentioned, another work, entitled 'The Last Days of a Philosopher,' which he also wrote during this period, has been given to the world since his death. He died at Geneva on the 30th of May, 1829. He had only arrived in that city the day before; and, having been attacked by apoplexy after he had gone to bed, expired at an early hour in the morning.

No better evidence can be desired than we have in the history of Davy, that a long life is not necessary to enable an individual to make extraordinary advances in any intellectual pursuit to which he will devote himself with all his heart and strength. This eminent person was, indeed, early in the arena where he won his distinction; and the fact, as we have already remarked, is a proof how diligently he must have exercised his mental

faculties during the few years that elapsed between his boyhood and his first appearance before the public, although, during this time, he had scarcely any one to guide his studies, or even to cheer him onward. Yet, notwithstanding that he had taken his place, as we have seen, among the known chemists of the age almost before he was twenty-one, the whole of his brilliant career in that character, embracing so many experiments, so many literary productions, and so many splendid and valuable discoveries, extended only over a space of not quite thirty years. He had not completed his fifty-first year when he died. Nor was Davy merely a man of science. His general acquirements were diversified and extensive. He was familiar with the principal continental languages, and wrote his own with an eloquence not usually found in scientific works. All his writings, indeed, show the scholar, and the lover of elegant literature, as well as the ingenious and accomplished philosopher. It not unfrequently happens that able men who have been their own instructors, and have chosen for themselves some one field of exertion in which the world acknowledges, and they themselves feel, their eminence, both disregard and despise all other sorts of knowledge and acquirement. This is pedantry in its most vulgar and offensive form; for it is not merely ignorant, but intolerant. It speaks highly in favour of the right constitution and the native power of Davy's understanding, that, educated as he was, he escaped every taint of this species of illiberality; and that, while, like almost all those who have greatly distinguished themselves in the world of intellect, he selected and persevered in his one favourite path, he nevertheless revered wisdom and genius in all their manifestations.

END OF VOLUME II.

Craik, George Lillie,

The pursuit of knowledge under difficulties illustrated by anecdotes

Bd.: 2

London 1845

H.g.hum. 37 m-1/3

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